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THE ELECTRICAL CONTRACTOR'S OPPORTUNITY AND RESPONSIBILITY.

Upon other pages of this issue we are pleased to publish two interesting papers dealing with the subject of co-operation upon the part of the central station, the electrical supply jobber and the electrical contractor and dealer in electrical merchandise. These papers were presented at the recent meeting of the California Association of Electrical Contractors, one by Mr. S. V. Walton, manager of the commercial department of the Pacific Gas and Electric Company, and the other by Mr. W. L. Goodwin, vice-president and general sales manager of the Pacific States Electric Company.

During a period of tremendous growth, when the demand for electrical equipment then available reached such volume as to give everyone an opportunity to participate in a developing market, there was not much necessity for careful analysis of or attention to the business methods pursued. The prospect of rich returns was alluring; the incentive for great activity was manifest. Consequently the aggressiveness and genius for organization of the American inventor, manufacturer and distributor soon discounted the market for electrical material and then came the battle for supremacy. The inevitable happened, and for several years we have been deploring a lack of a settled policy, a lack of harmonious relations, and a lack of standardization and stability in price.

When all the elements of a community suffer together it is natural that a closer community spirit be engendered. On the Pacific coast, because of one condition or another, the market generally has been disappointing for some time. While the per capita utilization of electrical material is higher than in any other division of the country, the building up of the domestic and industrial utilization of electrical apparatus and supplies has not grown with the ability of the central stations, the manufacturers and the distributors to anticipate the demand. Therefore, we find some very forward movements looking to co-operation upon the part of the various elements of the industry obtaining upon the Pacific coast. The electrical supply jobbers and the electrical contractors and dealers in electrical merchandise have attempted to weld their interests for the common good. The effort is being made even at the point of possible sacrifice upon the part of some of the interests involved to establish a definite relation with regard to the electrical supply jobber in doing business with the contractor and dealer, and the contractor and dealer in doing business with the ultimate consumer.

This policy is endorsed and supported by the Pacific Gas and Electric Company, the ramifications of whose network of distribution cover a great territory in the state of California.

The authors of both papers urge that the electrical contractor and dealer realize the opportunity and responsibility which a policy of this kind incurs. Manifestly the central station and the jobber have much to gain if the co-operative policy becomes the successful issue which its propagandists hope for. If the industry be retarded through the failure of such a policy, both of these elements suffer materially. It is the opportunity of the contractor to demonstrate his ability to so effectively work for the creation of new business that the jobber can rest satisfied with the demands made upon him upon the part of the contractor, for the manufacturer to remain satisfied with the demands made upon him upon the part of the jobber, and for the central station to remain satisfied with the development of its load. With the contractor bestirring himself to an active and intelligent endeavor to increase the utilization of electrical material, much of the effort heretofore made by the jobber and the central station to secure added distribution and more adequate demand in spite of the apathy of the contractor, may be directed to working with and for the contractor.

If there is anything at all in the proposition they are working out on the Pacific coast, and we believe that there is everything in it, this is the opportunity to demonstrate it. It will require manly and unremitting labor upon the part of the contractor to live up to his opportunity and it will require patience and support upon the part of the central station and the jobber. If they all work together and do not expect too much of one another the problem will solve itself, and the basis of effort, of patience and of reward lies here the same as it does in the relation of any other parties to an obligation, in absolute faith in one another.

AMERICAN MACHINERY IN FOREIGN SCHOOLS.

A suggestion which is well worth considering, on the part of American electrical manufacturers, was contained in an address by Mr. J. A. Massel, an agent of the Foreign Trade Bureau of the United States Department of Commerce and Labor, before a gathering of machinery manufacturers at the Boston Chamber of Commerce recently. Mr. Massel said that German manufacturers of various kinds of machines have been in the habit of donating samples of their products to engineering and other technical schools in Buenos Aires and other important South American cities. By doing so, the students are given a means of familiarizing themselves with the operation of the various mechanisms, which is of ultimate value to the donors, in that it influences the choice of the familiar machines in practical work after graduation. With the well known superiority of American-made electrical apparatus, it is believed that our motors, generators, regulating and controlling devices, farm and domestic appliances and other products will meet with a ready sale, at higher prices than those at which European-made goods are offered, once the excellence of our manufactures is recognized. And what better method of demonstrating to the youth of a foreign country than by furnishing them our best types of machines to work with during technical training? The gift of a thousand dollars or even a hundred thousand dollars' worth of machinery is not an uncommon thing in connection with the equipment of technical schools in the United States. Why not extend the benefactions to foreign countries, where the field is rapidly expanding to the demand for the best that North American enterprise and skill can offer?

THE BRITISH GOVERNMENT AND SCIENTIFIC ORGANIZATION.

For many years past scientists, engineers and leaders of industry in England have sought by public meetings, by the formation of guilds and societies, and by propaganda, to create a larger sympathy with scientific research and method in the mind of the people, and to secure from the Government a more generous appreciation of the true value of science in relation to industry, and a raising of the status of the scientific worker. English scientists and those who were familiar with the magnitude of the developments in progress in the United States, and in some Continental countries, have not been slow to point out the British weakness and its danger, whenever fitting opportunity has arisen. Yet time and time again they were tempted to relinquish the agitation as being almost a hopeless one. The history of the matter, if ever it be written, will form an astonishing record. The United Kingdom could claim world renown for its men of eminence in all departments of science, but what it lacked was a suitable organization of its forces, a more intimate co-operation between educational, scientific and industrial departments so that the available knowledge could be properly applied in order to profit the nation, and a wider scientific intuition on the part of legislators. So far as the actual heads of the nation were concerned, science and its votaries felt the influence of the cold shoulder.

The events of the past year, and a wider knowledge of the doings of other peoples in consequence thereof, gave greater prominence and timeliness to the agitation in its latest revival. The result is that the Government has through its Education Board set on foot a "scheme for the organization and development of scientific and industrial research." A permanent organization is being established, for any expenditure under which a committee of the Privy Council will be responsible. That committee will have an advisory council to guide it, such council being composed mainly of eminent scientific men and men actually engaged in industries dependent

upon scientific research. The first of these, announced at the end of July, are all fellows of the Royal Society, namely: Lord Rayleigh, Mr. G. T. Beilby, Mr. W. Duddell, Prof. Bertram Hopkinson, Prof. J. A. McClelland, Prof. R. Meldola, and Mr. R. Threlfall, with Sir William S. McCormick as administrative chairman.

The Advisory Council will primarily advise on (1) proposals for instituting specific researches; (2) proposals for establishing or developing special institutions or departments of existing institutions for the scientific study of problems affecting particular industries and trades; (3) the establishment and award of research studentships and fellowships. The council will keep in close touch with all government departments concerned with scientific research, and it will have regard to the research work which is done or may be done by the National Physical Laboratory. The Royal Society and the chief scientific and professional associations, societies and institutes, also the universities, technical institutions and other institutions in which research can be efficiently conducted, will all be brought into close co-operation with the council.

It is believed that the scheme which is briefly outlined above will meet the requirements of the case. Perhaps the chief drawback at the moment, and indeed for several years to come, will be the small funds which will be available. For the first year a hundred thousand dollars is to be allowed, but as the establishment gets well to work far larger allocations will be needed. The important thing, however, is that the first step has been taken. It should mean much for British industry.

RATES FOR LIGHTING AND POWER.

Central-station officials frequently meet the question of determining the rate which shall apply upon energy furnished to a motor-generator set which is used at least in part for lighting purposes. The consumer usually contends that a power rate should apply, whereas from the company's standpoint there is no reason why the lighting rate should not be applied to at least so much of the energy as is used for lighting purposes. The fact that energy undergoes some transformation in the motor-generator set does not change the characteristics of this portion of the load.

The question is called to our attention at this time by a case which came up in Scotland and was carried into court for decision. In this particular instance the court decided in favor of the customer, the reason for the decision apparently being that the evidence presented did not bring out clearly the distinction between the uses to which the energy is put and their relations to the rate schedule.

It is well to remember in this connection that the fundamental distinction which properly affects rates is that of the conditions of use rather than the purpose to which the energy is applied. It is convenient to classify customers according to the use of energy, since definite uses usually signify definite conditions with respect to load-factor and other important elements. With the fundamental basis for the distinction of rates in mind, there should be no difficulty in applying the correct solution to any particular case.

COST OF LIGHTING AND POWER SERVICE.

We do not have to go so far afield to find indications of a lack of perception of the elements of cost in furnishing electric service. The Public Service Commission of Indiana, in a decision referred to on other pages of this issue, displays as little acumen in this connection as did the Scottish magistrate. In an opinion in the case of the Merchants Heat & Light Company, the Commission assumes that there are only two reasons for a distinction in rates between lighting and power customers. One of these is the potential competition of isolated plants, which makes the value of the service less per unit of energy in the case of the power customer. The other is the fact that most electric central stations were started for the purpose of supplying electric lighting and the power load has been a more recent development which it is justifiable to take on at an income which does not supply a proportional amount of the overhead charges. In the words of the commission, "It necessarily costs just as much to generate the 200 kilowatt-hours for power as it costs to generate the 200 kilowatt-hours for lighting, and the only reason for making the difference in favor of the power rate is an arbitrary one, because the business will stand the rate in the lighting case and will not stand it in the power case."

This indicates an unfamiliarity with some of the basic elements of the cost of service. If the statement were true it would mean that a power station which supplied energy for motor load alone, such as a street-railway generating plant, could not furnish electric energy any more cheaply than a central station supplying energy for lamps alone. Actual instances abound which disprove this contention. The fallacy lies in the fact that while the cost of generation does not depend upon the use to which the energy is put, it does depend upon the load-factor of the system, and this is invariably much higher for a motor load than for an exclusive lighting load.

As an example of a system which supplies almost entirely a motor load, we might mention the Rand Mines Power Company in South Africa, which has a load-factor of about 75 per cent. This element of load-factor alone would make the investment cost per unit under such a condition only one-seventh of the cost of supply for a lighting system where the load-factor is but ten per cent. Operating costs are also lower in the former case. This does not take into consideration, either, the fact that the cost of distribution is much less where the energy is supplied in bulk to large customers than where it must be distributed to a large number of small customers.

Plans for Boston Electrical Exposition.

Preliminary plans for an electrical exposition on a larger scale than has thus far been attempted have been formulated in Boston, Mass., to the extent of deciding to hold such an exhibition in connection with the Pilgrim Tercentennial in 1920, and the appointment of an organization to undertake the work. The exposition will be held under the auspices of the Edison Electric Illuminating Company of Boston, and the following Edison men are in charge: Charles J. Hatch, manager; C. E. Greenwood, assistant manager; L. L. Edger, secretary; W. H. Francis, treasurer; L. D. Gibbs, publicity manager.

There is a project for the erection of a permanent exposition building, with the backing of various public service companies of Boston and New England, which shall be used not only for the great Electric Show, but also for all kinds of expositions and conventions held subsequently. It could also be the home of a permanent electric display and demonstration, in which manufacturing companies would occupy spaces and present a line of their products week by week. It is believed that owing to the fact that many electrical inventions originated in Boston and its neighborhood, there is a peculiar fitness in holding such a public exhibition of electrical progress on the ground first settled by the Pilgrims. A State Commission has been appointed by the Governor to develop plans for the occasion.

Another Perpetual-Motion Primary Battery.

A man named George S. Engle has been indicted in Washington, D. C., for obtaining money under false pretenses in promoting companies to manufacture and sell a "self-generating and recuperative" primary battery. Not only was it promised that the battery could run automobiles and airships, but it was to "furnish light, heat and power at less than half the cost of coal." The following brief and lucid explanation of the action of the battery was given: "We break the molecules of oxygen in a chemical action and reaction, and get a free discharge from the electrons concealed in the oxygen so that the same volume of our current contains more power than the same volume of the old current in primary batteries."

The laws of electrochemistry would have to be re-written. The battery had already attained a zinc efficiency "5.98 times the theoretical figure." A test by the Bureau of Standards, however, failed to show that the established laws of physics and chemistry needed any revision, whereupon disillusioned stockholders laid charges before the district attorney, and the indictment followed, but after a delay of a year and a half.

It is stated that $100,000 had been received from the sale of stock. There were to be several interlocking companies, the principal ones with their capitalizations being: American Elementary Electric Company (parent company), $25,000,000; Auto Company, $50,000,000; Motor boats, $25,000,000; railroad train lights, $25,000,000; State Companies, $210,060,000.

Thomson Quarter Century Club Meeting.

The fifth annual meeting of this organization was held at the "Suntang Inn," Lynnfield, Mass., on July 31, and was attended by about 200. To be eligible for membership a person must have worked continuously at least 25 years for the Thomson-Houston Electric Company and its successor, the General Electric Company. The membership this year is 225.

At the banquet while the speaking was in progress the electric lights suddenly went out. A waiter rushed for a candle, which was lighted and stuck into a cigarette box, and this furnished all the illumination during a part of the program. Prof. Elihu Thomson, after whom the club is named, made the incident the occasion of a forcible reminder of the progress made in lighting.

Walter C. Fish, manager of the Lynn plant of the General Electric Company, made a plea for union and co-operation. Another speaker was Albert L. Rohrer of Schenectady, a former engineer at the Lynn plant.

Each member of the Club was presented with a solid gold button with the words "Thomson Quarter Century" around the edge, and the letters "GE" in the center.

The present committee consists of Frank P. Cox, Daniel B. Gauchet, John Morse, Edw. H. Kelley, and William B. Murray. L. S. Urquhart was chosen secretary.

Joint Meetings at San Francisco.

The Institute of Radio Engineers will hold two joint sessions with the American Institute of Electrical Engineers on September 16 and 17 at San Francisco, Cal. One paper, by Harris J. Ryan and Roland G. Marx, is entitled "Sustained Radio-Frequency High-Voltage Discharge." This paper considers the flame and brush types of discharge obtained from conductors when a powerful arc generator is used to apply voltages up to 56,000 volts at frequencies as high as 200,000 cycles per second.

At the session on Friday, September 17, Robert H. Marriott will read a paper entitled "Radio Development in the United States."

Plans for the New York Electrical Exposition of 1915.

In the relative importance of electrical achievements as chronicled in the annals of past New York Electrical Expositions, the show of 1915 is to record the introduction to the public of a scientific triumph which takes precedence over all recent wonders. Visitors at the Electrical Exposition are to be in hourly telephone communication with the Panama-Pacific International Exposition during the afternoons and evenings by means of the new transcontinental telephone line. A demonstration hall similar to that at the San Francisco Exposition will be constructed in Grand Central Palace and all of the 250 seats will be provided with telephone receivers so that the two audiences, one in New York and the other in San Francisco, may listen to greetings from each other at the same time. In considering the practicability of carrying on the demonstrations it was discovered that the difference in time between New York and San Francisco favored the project. Simultaneously with the first daily demonstration in San Francisco at 11 o'clock in the morning the early afternoon audience will have assembled for a 2 o'clock demonstration at Grand Central Palace. Likewise the hourly demonstrations in San Francisco beginning at 1:30 and ending at 5:30 o'clock in the afternoon will synchronize with those in New York from 4:30 to 8:30 p. m.

The importance of this will be readily appreciated when it is pointed out that to carry on the present demonstrations in one direction only the wire must be reserved for one-half hour on six occasions daily. The commercial toll rate for three minutes is $22, so that the value represented in the use of the wire for the ten days of the Exposition is $13,200.

The Telephone Company will probably transfer its transcontinental station temporarily from Lispenard Street to the Palace. Both in New York and San Francisco a lecturer will explain with the aid of moving pictures the construction and electrical and mechanical wonders of the transcontinental line. While both lectures are in progress the audiences will take up the small individual telephone sets and the talking across a continent will begin.

It is obvious that the Telephone Company will reap an advantage by the adoption of the plan, for instead of demonstrating to one audience there will be two demonstrations going on at the same time on the same connection. In other words the Telephone Company will double the advertising effectiveness of the connection without increasing the cost or the period for which the line is reserved.

Electricity in Cement Manufacture.

By Norman G. Meade.

This article deals with the application of electric drive and central-station service to cement manufacturing with a discussion of the processes involved and the characteristics of the motors best suited for the various services.

Owing to severe operating conditions, heavy overloads and the constant presence of grit and dust, cement mills present exceedingly trying conditions from a power standpoint. Electric drive has, however, proven entirely successful in this industry and has many advantages. Induction motors are largely used owing to their practical immunity from damage by dust and to the fact that nearly all cement-making machinery has constant-speed characteristics. When individual drive is used the motor and its coupling to the machine, of whatever type, may be effectually encased if desired.

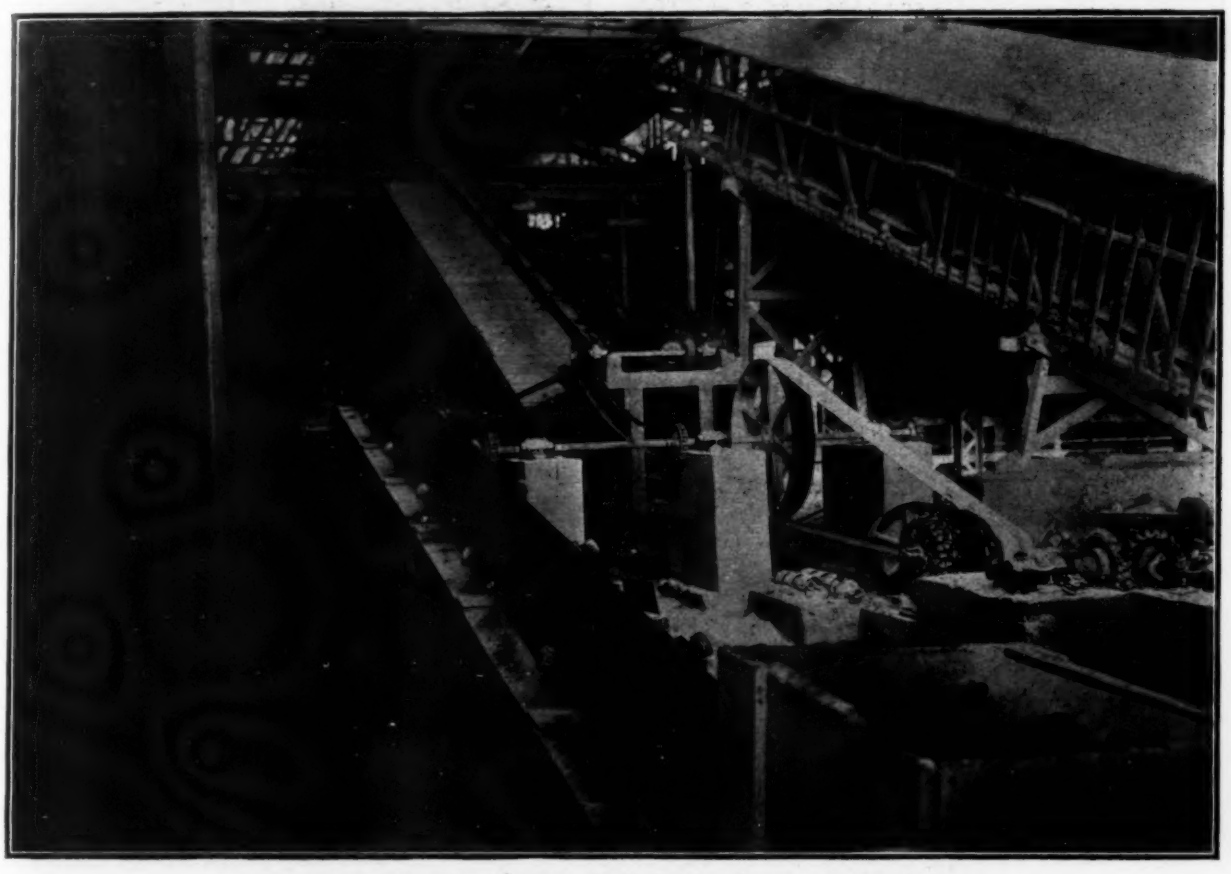
It can be readily realized that with so much grit in the atmosphere of the buildings, the bearings and shafting hangers are subjected to extremely rapid wear, causing excessive expense for renewals, and greatly increased friction losses. Again many of the machines have but intermittent service so that the flexibility of electric drive adds another important advantage, not only from the standpoint of flexibility, but from decreased power costs. The machines may be located in the logical positions for proper sequence of operations which is rarely possible where mechanical drive from a central source of power is used.

Cement-making machinery, especially rock crushers, are subject to excessive overloads and the power requirements fluctuate widely during each revolution. Where belting and shafting are used in connection with a centrally located prime mover, the equipment of shafting, hangers and belts must be abnormally heavy and the building construction must be of superior strength on this account. The matter of flexible control, which is possible with electric drive, is also important as the driving motor is under the immediate control of the operator and can be placed in the most convenient point of advantage. With mechanical drive, starting and stopping is necessarily dependent upon a counter shaft or similar device which must be located with definite relation to the main line shaft.

Increased production is another important feature of electric drive in cement mills. The widely fluctuating loads are met by the motor and gearing, or couplings, without material changes of speed, but where belting and shafting are employed the slippage causes widely varying speeds of machines with a distinct loss in production. Another feature is the necessity for delivering power to scattered locations.

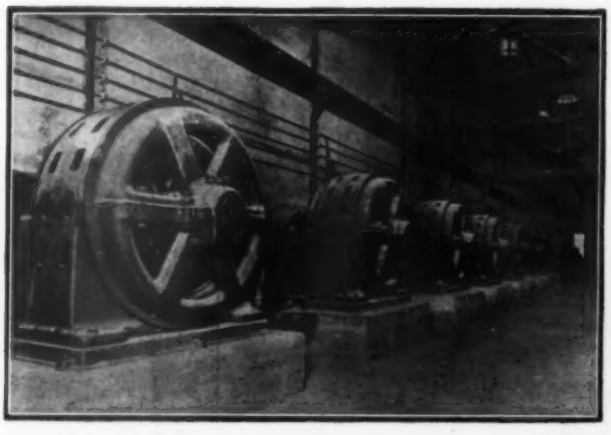
The raw products for the manufacture of cement are quarried and the quarry is frequently some distance from the mills. The buildings themselves are also more or less separated in many instances. Under such conditions, if steam engines are used for power, numerous small units with low efficiency are required and in the case of the quarry a separate boiler plant is frequently necessary. When central-station service is used in connection with motor drive a system of high efficiency and great flexibility is the result.

Small cars are generally used for trans-

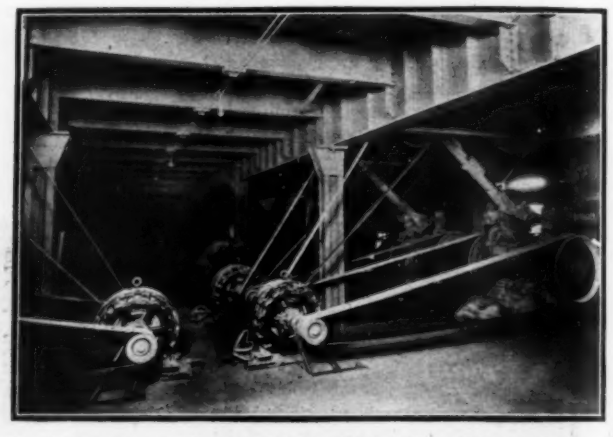


Fifteen-Horsepower Squirrel-Cage Motor Driving Conveyor in Storehouse.

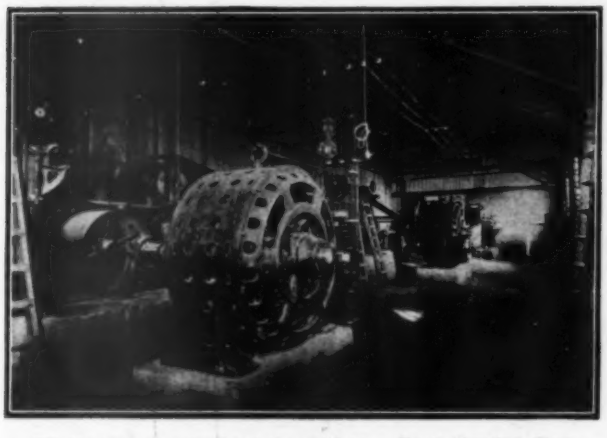
porting raw material from the quarries to the mills. Where central-station service is available these cars can be equipped with motors and the cumbersome cable haulage, or the slow and unsatisfactory mule drawing, can be dispensed with, insuring greater tonnage per unit of time with reduced number of employees. Furthermore central-station service is admirably adapted to cement mills as there is little use for steam in the manufacturing processes and the buildings are but slightly heated, so that a small low-pressure boiler equipment answers every requirement.



Thirteen 200-Horsepower Squirrel-Cage Motors Driving Tube Mills in Adjoining Room.



Six 40-Horsepower Motors Driving Kent Mills—Chicago Portland Cement Company.



250-Horsepower Squirrel-Cage Motors Each Driving Two Tube Mills.

75-Horsepower Squirrel-Cage Motors Driving 42-Inch Fuller Mills.

Process of Manufacture.

The constantly increasing use of concrete for building has enormously increased the demand for cement and when it is considered that, as stated by authorities, fully nineteen-twentieths of all Portland cement used at the present time is artificial, it will be realized how great is the number of mills required to supply the demand.

In general, Portland cement is made by thoroughly mixing together, in suitable proportions, clay and finely pulverized carbonate of lime (either chalk, marl, or compact limestone), burning the mixture in kilns at high heat, and then grinding the burnt product to a fine powder between ordinary mill stones. There are two methods of manufacture, both well adapted to the character of the materials used, and known respectively as the wet process and as the dry process.

Wet Process.

Clay and chalk are mixed together with a large quantity of water, in a circular wash-mill or basin provided with heavy harrows attached to the horizontal arms of a revolving vertical shaft. By this means the chalk is thoroughly pulverized and incorporated with the clay in a semi-fluid state. The proportions are about one of clay to three of chalk by weight. When a thorough mixture of the ingredients is thus effected, the liquid mass, resembling whitewash in appearance, is conducted into large reservoirs called backs, where it is left to settle.

When the heavier material, or raw cement, has settled to the bottom, and the surplus water has become clear on top, the latter is drained off. By subsequent evaporation, the drying process is continued until the raw cement has attained the requisite stiffness.

During the time the mixture remains in the backs, samples of it are taken from time to time and made into cement by burning in sample kilns, in order to test the accuracy of the proportions. When by evaporation, the raw mixture has attained the consistency of stiff clay, it is taken out of the backs by shovelfuls and in that form and condition is removed to rooms and artificially heated or spread out around the tops of the kilns and further dried.

After being dried, although it is not necessary to expel all of the moisture, the cement is burnt in suitable kilns to nearly a white heat, just below the point of incipient vitrification. The kilns may be intermittent or perpetual, the latter being most economical in operating expenses, though somewhat more costly in outlay for construction.

When properly burnt, the pieces of cement called clinker, are of a greenish-brown color, contorted and much shrunken from the heat. The cement clinker is then finely ground between ordinary mill stones, packed in barrels, each containing about 400 pounds net and sent to market.

Dry Process.

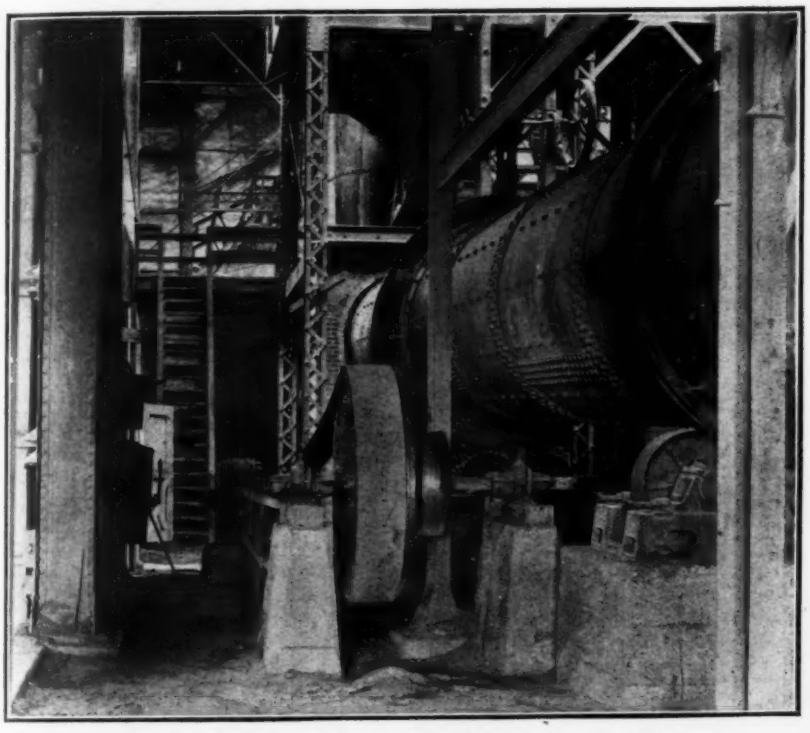
By the dry process any of the compact lime stones, as well as the chalks and marls, may be used in making Portland cement. The raw materials, the carbonate of lime and the clay are kiln-dried at 212 degrees Fahrenheit, in order to expel the moisture and prevent caking in the kiln, and otherwise facilitate grinding and sifting. After drying, the clay and the carbonate of lime are mixed together in suitable proportions and reduced to fine

powder. In most localities the proportion will vary from 20 to 23 per cent of clay and 77 to 80 per cent of the carbonate.

One kind of machine will not suffice for grinding the raw material economically. Three machines are generally used in the dry process: A stone-breaking machine of the kind usually employed in breaking stone for roadways or for concrete. Through this the dried and mixed materials are passed, issuing therefrom in pieces varying from the size of a pea to that of a hen's egg. A further reduction is effected by a vertical mill or edge-runner. The material is then finely ground between horizontal mill stones.

The powdered material is then tempered to a rather stiff paste in a brick-making machine, and made into bricks of suitable size for burning. During this mixing the material is kept warm and the water used for tempering is rendered strongly alkaline by adding 3 to 6 per cent of calcined soda and an equal amount of newly burnt slacked lime. The bricks are dried by artificial means and then burnt at a high heat and ground to a fine powder as in the wet process. The same number of mills is necessary for grinding the cement as for pulverizing the raw materials. The clinker is first put through a stone-breaking machine, then into a vertical mill or edge-runner, and lastly is ground to an inpalpable powder in a horizontal mill.

In 1914 the United States produced 1,247 tons of asbestos, valued at $16,810.



75-Horsepower Motor Driving Rotary Dryer, 6 by 50 Feet.

New Method of Making Service Connections.

A system of underground construction, known as the split-fiber system, has been inaugurated by the Boston Edison Company in locations where the regular conduit or tube systems are not warranted because of their cost, and where pole locations cannot be obtained.

The system consists of a three-wire low-tension main made up of two 4/0 conductors laid side by side, each in a two-inch fiber pipe, along the top of which a slot has been cut. The conductors, which are ordinary weatherproof line wires, are placed in the pipes, which are then filled with melted coal-tar pitch. This solidifies on cooling and waterproofs the line wires. The neutral wire is an ordinary 1/0 weatherproof line wire laid in the earth between the fiber pipes. After the pitch cools, the two fiber pipes are covered by a two-inch Kyanized spruce plank to protect the main from disturbance if excavation is made later.

Small wooden boxes 12 inches square and 6 inches deep contain the service connection, the fiber pipes being cut off flush with the inside of the box. Fiber pipe 2.5 inches in diameter is used for connection with the building, with standard rubber and lead cables. The box is filled with molten pitch and a plank cover laid over it. If an additional service is required on the line, it can readily be added by building a service box on the existing main, opposite the house.

The new system, while more expensive than overhead construction, is much more economical than the regular conduits, with manholes, lead-covered cables and wiped joints. An experimental installation made several years ago in Dorchester has been found unimpaired on examination recently.

Electric Cookers for Workmen's Houses.

On the advice of its electrical engineer, C. S. Davidson, the Barnes (England) municipal council will put twelve electric cookers, costing $20 each, in some workmen's cottages that it has had built. This figure includes cost of wiring and installation. Calculating upon a life of ten years for the cooker, and allowing for five-per-cent interest and redemption of capital during that period the yearly rental is to be fixed at $2.50. The makers of the cookers offered to maintain the cookers at $1.25 each per annum, but Mr. Davidson believes that if his department does this work the cost will be considerably less. The charge to consumers is to be two cents per kilowatt-hour. Experience of the different seasons leads the engineer to expect a yearly consumption of 624 kilowatt-hours per cooker.

Electric Light Plant for Construction of Dam in Wilderness.

In the construction of a 1,000-foot dam for the Great Northern Paper Company, at Ripogenus Gorge, on the west branch of the Penobscot River in northern Maine, a complete electric lighting plant has been installed by the Aberthaw Construction Company, of Boston, which is doing the work. A small power station has been built and a generator set with a 25-horsepower gasoline engine installed. This furnishes ten 1,000-watt nitrogen-filled lamps for construction work, which is being prosecuted at night, and also lights the camp buildings.

The development at Ripogenus is a link in the extensive hydroelectric development of the river for paper manufacturing purposes. The dam is 50 miles from the railroad, and will form a lake 25 miles long as a reservoir for generating power.

Utility Sells Stock to Customers on Partial-Payment Plan.

The Northern States Power Company, operating plants in Minnesota, Wisconsin and Illinois, has decided to sell stock, in amounts not exceeding 10 shares, to its customers on the partial-payment plan, at the rate of $5 per share per month. The company in making this offer took into consideration the value of having a large number of customers stockholders.

Commercial Practice
Management, Rates, New Business

Unique Advertising Stunt of Dayton Company.

An innovation in electric-fan advertising was the scheme adopted by the Dayton (O.) Power & Light Company of placing 12 16-inch oscillating fans on the same number of lighting standards on two blocks of Main Street on July 31. Attached to each standard was a sign reading, "Keep Cool. The Dayton Fan & Motor Company Made In Dayton Electric Fans Operated by the Dayton Power & Light Company."

While the fans were placed simply as an advertisement many shoppers took advantage of the breeze and all of the papers commented favorably on the installation.

The Dayton *Journal* made the following interesting comment:

"Shoppers, market tenders and patrons extended thanks Saturday to the Dayton Power & Light Company for thoughtfulness for the welfare of the public, shown when during the early morning there were placed a dozen 16-inch oscillating fans at various vantage points along the east side of Main Street between Third and Fifth Streets.

"That the innovation was appreciated and proved popular was shown by the large number of those who stopped in their journeys up or down street long enough to enjoy to the full the cooling breezes produced by the wind stirrers. Newsboys pushed each other for places of vantage, while tired and heat-fagged marketers halted in their paths with sighs evidencing the relief they felt.

Incidentally the innovation was just another evidence of the enterprise of the power and light company in contributing its share to the general welfare work of the community."

Large Power Contracts Secured at New Orleans.

All electricity for light and power for the New Orleans Cotton Warehouse and Terminal will be supplied by the New Orleans Railway & Light Company, according to the terms of a contract recently signed. The connected load will aggregate 2,800 horsepower. The terminal project is a development of great interest and importance to the entire country, as it is designed to establish New Orleans as a great deposit market for cotton. The plant covers 150 acres, with yard tracking for about 2,000 cars and a cotton storage capacity of about 675,000 bales. Electric locomotives will be used exclusively for handling trains within the terminal.

Another important power contract recently secured by the New Orleans company calls for an installation of 882 horsepower in motors and 12.5 kilowatts in lighting, for the operation of a 200-ton raw-water ice plant, for icing fruit cars. There are two main ammonia compressors, each driven by a 350-horsepower 2,300-volt motor, two deep-well pumps are driven by a 35-horsepower 2,300-volt motor and the auxiliaries requiring from 1.5 to 20 horsepower, are driven by 230-volt motors. These auxiliaries aggregate 112 horsepower. The plant has been running about five weeks, and in the first month the consumption was 322,000 kilowatt-hours.

The load is particularly valuable to the company, as it is off-peak.

Parcel-Post Delivery of Lamps Successful in Boston.

The delivery of incandescent lamps by parcel post has proved so satisfactory in the Boston territory that the Boston Edison Company is rapidly extending this system to cover all outlying districts. The delivery by mail is found much more economical and satisfactory than the old method of periodic wagon delivery, and this is especially true in localities where branch electric shops have been established. It has been the experience of the Boston company that during the summer months effective calls drop down to as low as 17 per cent of all calls made.

Novel Method of Advertising Electric Shop.

At the recent outing of the benefit association of the Union Gas & Electric Company, Cincinnati, O., held on July 24, the employees of the Electric Shop made a decided hit, being marked by enormous sun-flowers, worn as badges, and having with them a goat as a mascot. The latter was paraded over the grounds wearing a blanket bearing the name, "Electric Shop," and the force was much applauded for its showing.

Group of Electric Shop Employees With Mascot.

Hot Weather Sales Record at Toledo.

April 26 was the hottest day for that month in Toledo's history, exactly as was the case in New York, Chicago and many other cities. But the new-business department of the Toledo Railways & Light Company perspired to some effect and much profit. Sensing the talking point advanced by nature the salesmen chalked up this record: 26 electric fans, 18 electric irons, 14 vacuum cleaners, 1 motor driven meat chopper, 1 electric vibrator, 100 horsepower in motors, representing seven contracts; 1 sewing machine motor and several house-wiring contracts.

Electric Meter Housing for Rural Districts.

The Pacific Power & Light Company, Portland, Ore., has recently adopted a simple and effective housing for electric meters installed in ranch sections of its territory. This housing, shown in Fig. 1, has been designed to carry both meter and switch, in upper and lower compartments, respectively, and is provided with peaked roof so as to make it watertight.

Fig. 1.—Meter Housing for Rural Installations.

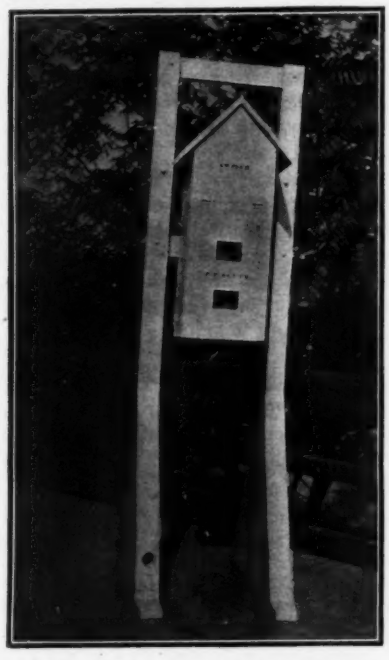


Fig. 2.—Housing as Used in Operation.

The outside cover, or door, for the lower section is fastened with screws, and only to be removed for testing or repairing of meter; the upper door is hinged at the bottom to allow of ready access. Two small rectangular holes, provided with glass, are arranged in the lower door to allow for meter reading without opening.

A view of the meter housing as used in operation is shown in Fig. 2. These boxes, painted a light gray color, are mounted on a substantial framework several feet from the ground. When desired, however, they are placed directly in the pump house.

Used primarily in the irrigation districts for individual ranch owners who operate on a moderate scale, these boxes have eliminated considerable meter trouble as formerly evidenced. Many farmers do not go to the expense of erecting proper shelter for pumping equipment, and under these conditions the electric instruments are left exposed to the weather or covered by a few boards. This meter housing has gone far to correct this abuse.

B. C. Bailey, manager for the Pacific company at The Dalles, originated this plan.

Expansion of Electric-Vehicle Business in Boston.

Electric storage-battery trucks, replacing trolley mail cars, have been adopted by the United States government for the handling of mail in the postal district of Boston, Mass. The new vehicles begin service August 15.

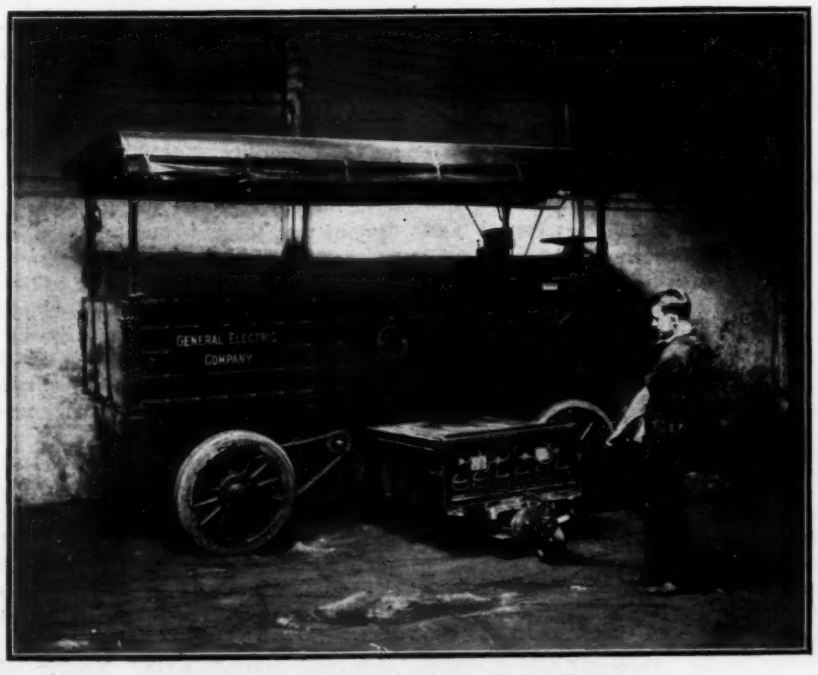
The Boston Mail Delivery Company, with a capital of $50,000, has been organized by the same parties who have the contract for handling the mails in the New York district. There will be 13 mail trucks, of General Vehicle Company manufacture, each of 1.5-ton rating. Ten trucks are for delivery only, and two for collecting the sacks from postal stations and delivering them to the general postoffice. The former will be manned by a chauffeur only, and the latter will have a mail clerk in addition to the chauffeur. Each of the Boston Elevated Company's mail cars run hitherto, has carried a conductor, motorman and clerk.

The sacks had to be taken from the loading platforms in the postoffice basement in horse-drawn wagons, which entered the building by a ramp from the street at either side, and then transferred to the cars, which stood in the center of the street. This double handling of the sacks is now obviated, the electric trucks entering the building and loading and discharging at the basement platforms.

Some of the suburban mail service now handled on the railroads will be performed by the new trucks. Mails "worked" at the north and south terminals will be handled by truck from those points, but sacks directed to the general postoffice, arriving by train, will continue to be hauled by wagon.

The longest run to be made on any route is 23.5 miles; the next longest, 18.5 miles. These runs cover a circuit of the suburbs and include stops at several sub-postoffices. The cars will be run during the day and well into the night, and some extra trips will be made on Sundays.

Garaging and care of the trucks will be performed at the Boston Edison Company's Atlantic Avenue electric garage, where interchangeable storage batteries will be kept charged, to be



Method of Handling Batteries in Boston Garage.

immediately substituted for spent batteries when the trucks come in from their runs. This service will be performed under the plan lately inaugurated by the General Vehicle Company, the Electric Storage Battery Company of Philadelphia and the Boston Edison Company, by which General Vehicle trucks are supplied with charged battery service on a mileage basis, as described in our issue of July 17.

The battery equipment consists of 44-cells, 15-plate Ironclad, and there will be 15 batteries for use of the cars. With the addition of two more trucks soon, other battery units may be added. Present charging facilities, which include 18 stations, are sufficient for present requirements, but with the growth of the electric-vehicle mileage-selling plan, the Edison Company may adopt a method of handling the batteries by means of an elevator which will bring up the units from a basement to position beneath the car, such as is in operation at the Hertford Street Garage in London, described in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN of August 15, 1914; or else provide roller runways to transport the batteries from the charging positions to a point alongside the trucks, whence the trays are rolled into place horizontally. At present, however, the batteries are moved on a hand truck, as shown in the illustration.

Those in charge of the Boston Mail Delivery Company's business say that the electric trucks will greatly facilitate the handling of Boston's postal matter, will diminish delays through the breakdown of trolley service, and deliver mails at suburban postoffices earlier than the Elevated Company's cars have been able to do it.

A Salesman's Window Display Competition.

Since the opening of the new Electric Shop in Little Rock, Ark., the problem of maintaining good window displays has proved an interesting and a difficult one, and in searching for the best solutions, a personal competition was inaugurated among the salesmen to see who could devise the one appealing display of electric appliances. Each member of the commercial department of the Little Rock Railway & Electric Company was delegated to take charge of the window displays for a week and dress the windows according to his own ideas, without assistance from the commercial manager or another member of the staff, thereby pitting each man against his fellows. The results have been surprisingly good, and in a great number of cases have developed an ability in the art of window dressing that the man himself had not suspected.

Mixing.

The United Gas & Electric Engineering Corporation, New York, controlling properties in some 20 cities, presents the following pertinent message to its employees in a recent issue of its monthly *Bulletin:*

No matter how large the holding or operating company of a public utility may be, much of the success of the subsidiary company is dependent on the personnel of the local representatives.

The holding company maintains a large variety of departments, always at the service of the underlying companies, to meet their needs in engineering, purchasing, advertising, selling, litigation, financing and other advisory capacities, and a general policy of operation is outlined at the "home office," subject to change or variation to meet local conditions, but for the net results, the dollars and cents that pay dividends, the local management is responsible.

Successful operation of the utility would not be possible if customers were dissatisfied, the public in arms against the corporation and dissension existed among employees. The hypothetical existence of conditions of this nature would seem impossible, and is for any length of time, yet there are companies operating today, in which such conditions exist in varying degrees, and principally because there is something lacking in the personal touch of the local representative.

It is impossible for a human being to grasp the true nature of the holding company, for he cannot visualize the object, it seems intangible, and for this reason it is the local management, the real flesh and blood individual, for whom the likes or dislikes of a community are formed. The local manager and his assistants, therefore, carry a large share of the burden of responsibility for the attitude of the public toward the utility.

So it behooves those of us who daily meet the customers of the company to demonstrate through our own actions and demeanor, that the word "corporation," as applied to the public utility, does not stand for the soulless, blood-sucking octopus as is popularly believed. It is up to us to be good "mixers," to make acquaintances and friends for ourselves and for the company which employs us.

Now there is mixing of many kinds and degrees. There may be on the one hand the exclusive type, which concerns itself with only the high and mighty of the locality, and, on the other hand, there may be the diffusive type that wastes itself on unimportant and useless acquaintances of the Tom, Dick and Harry" style. Neither of these is a perfect asset to the company, although, as a rule, the latter is to be preferred to the former, especially in the smaller cities and towns. While all people, particularly those immediately involved, deprecate pride or aloofness which borders on snobbishness, in the local representative, they also appreciate a certain amount of dignity.

In this matter, tact is a vital item. To know everyone, to be cordial and interested in each one, to make a personal and individual case with each, to avoid useless discussions, partisanship and cliques, to show to each that respect, cordiality, affability and geniality, demanded and approved by them, is the highest type of tactfulness, and is the best asset of the representative of the utility company.

Memberships in local commercial, industrial and benevolent organizations are valuable assets to the public utility if used actively. By this is not meant that the representatives of the utility should be "joiners" of every secret organization with the grip and password at their fingers' and tongues' ends, ready to take on any new responsibility suggested or offered—but in almost every city there are certain organizations, private, public, social and commercial, an active membership in which is often a strong factor in the popularity of the individual, and one which, if properly handled by him, will add greatly to the benefit to the company.

Another phase of vast importance is that representatives, from the manager down, be readily accessible to everyone, and if, at the time of inquiry, the person in question is out of the office or busily engaged, intelligent information should be given as to the earliest possible moment an interview may be had. Formality, delay and red-tape are things of the past with the up-to-date company, and should be relegated to the scrap heap along with other obsolete equipment.

Of course it is an acknowledged fact that "too much of a good thing is good for nothing," but there is the happy medium that must be striven for, and care must be taken that the part does not become greater than the whole.

The other portion of the problem is a personal one with the representative, if he forgets that he is only a representative and begins to presume an ownership of the corporation, and if instead of the corporational "we," he gets into the habit of the egotistical "I," then it is time for suggestion, guidance or criticism. It is a good motto to take as much interest in the business as though it were your own, but it is also well to be able to distinguish which is egotism, thoughtlessness and personal aggrandizement, and which is honest endeavor for the best interests of the company.

SUCCESSFUL COMMERCIAL MANAGERS.

Charles B. Yonts.

Charles B. Yonts, general contract agent of the Illinois Northern Utilities Company, serving a number of towns in the northern half of Illinois, has been closely identified with the sales end of the central-station business for the past nine years, and during that time has established an enviable record for achievement in furthering the uses of electricity for every purpose.

Starting with the McKinley Traction System in 1906 as sales manager at Danville, Ill., he was made manager of the new-business department for the entire system in 1910, and in this position had entire charge of the commercial activities of properties operating in a number of towns in central and southern Illinois, Iowa and elsewhere. In 1912 Mr. Yonts resigned to accept the position of general contract agent with the Illinois Northern Utilities Company, which position he now holds.

The most successful period of his experience was with this company from May, 1912, to August, 1914, during which period he doubled the number of electric customers on the lines. Most of the customers were taken on by a systematic house-to-house wiring campaign, subletting all of the work to the contractors, a policy which has had a great deal to do with the success of the campaign.

The company does the wiring on a basis of so much per outlet, enabling the salesman to make a price complete, ready to light, to the prospect on his first visit, making the same price per outlet to everyone.

Featuring special five-room house-wiring propositions has been of great assistance, as also the fact that the company has offered special inducements during the dull months of February and March and July and August of each year. In conjunction with the house-wiring campaign more than 4,000 electrically heated and operated appliances for the home have been sold. Most of these appliances have been sold at the regular resale prices, concessions being made only on special campaigns.

The profit from the sale of the merchandise, after a liberal handling charge has been added, has been more than enough to pay the operating costs of the sales department.

Another thing that aided materially in increasing the number of customers was the reconstruction of the street lighting systems of the different towns. Of the 39 towns in which the company operates 26 new street-lighting contracts have been signed during this period. In each case the candlepower of the lamps was increased, as was the cost of operation, yet, on account of the improved service, the increased cost was overlooked. In almost every case the street-lighting conditions created a lot of criticism favorable to the company, and, of course, was a good thing for the salesmen.

Regarding power business Mr. Yonts says: "We had a rather unusual experience in the power end of our electrical business in this territory. A large part of our power business is grist milling, this being a dairy district. We found mills in almost every town of 1,000 inhabitants or more. Most of these plants were using steam, and we got them changed over to motor drive. Later, we lost one customer by the

Charles B. Yonts,
General Contract Agent, Illinois Northern Utilities Company.

installation of a crude-oil engine, he being enabled to operate much cheaper than with electricity. We were then forced to use a more efficient machine, and to better appreciate the story, will say that the gristing is done with both the Burr and the attrition mills. The attrition mill has a much higher efficiency than the old Burr mill. In a number of cases we got the customers to change over to attrition mills, belt-connected to a motor. Still the operating costs were too high, and competition growing keener, we were forced to change over to the direct-connected attrition mill. This mill has an efficiency of almost three to one over the old Burr mill. I merely state this in passing to show that in a period of two short years some of our customers have changed their equipment three times to improve the efficiency, and in each case it paid. This forced us to bring the more modern appliances to their attention.

"My first experience in the electrical business, which might be well worth relating, was that of electric lighting to compete with gasoline lighting plants with a 10-cent rate per kilowatt-hour and 10 cents per gallon for gasoline. In a town of 15,000 inhabitants in 1907, when the tungsten lamp was first put on the market, we replaced 22 gasoline lighting plants with these lamps, which increased our annual income $4,000.

"The second step of my education was the electric sign business. We placed 69 signs in this same town within a period of 18 months. By selling the sign outright to the customers and giving them a flat rate of 10 cents per two-candlepower carbon lamp per month, burning from dusk until 11 o'clock each and every night of the year, on these signs alone our annual income was increased more than $8,000 While this was as far back as the year 1907, and might not be of interest to the present-day salesmen, yet there are just as great opportunities in some cities today as there were then, and no doubt if the same methods were employed the results would be equal.

"We are right now in the midst of a 'clean up' house wiring campaign. In our territory most of the prospects have been called on and given a price on the cost of wiring their residences for electricity. During the months of February and March we offer a 15 per cent reduction from our regular prices, giving the customer the choice of 24 months to pay, or five per cent discount for cash, and stating the reason for making this discount at this time, as that of keeping our men employed during a dull season. To avoid a bunch of orders coming in the last two weeks of this campaign period, we offered an inexpensive portable lamp with every contract signed during February.

"To appreciate our reasons for making this very special campaign, one must know that we now have better than one electric customer to every six inhabitants in the territory in which we serve, yet for the month of January we added 82 customers. We think the campaign successful so far, when general business conditions are considered."

Change at Grand Rapids.

Grand Rapids-Muskegon Power Company has changed its name simultaneously with a change in the incorporation of the Consumer's Power Company, in which it has been a subsidiary. The latter concern has ceased to be a Maine corporation and has reincorporated under the laws of Michigan. The Grand Rapids-Muskegon Power Company becomes a part of a new corporation and will hereafter be known as the Grand Rapids plant of the Consumer's Power Company.

Wiring Contracts in Columbus.

The Columbus Railway Power & Light Company, Columbus, O., is one of the central stations which is co-operating very actively with the electrical contractor in advancing the wiring of old residences as well as commercial properties.

The company has prepared a form of contract for residence wiring between customer and electrical contractor and this includes the deferred-payment feature. Payments when desired can be made in five monthly installments. Upon securing a customer this contract is turned over to one of the local contractors, each of those desiring this class of work being given an opportunity in turn to secure one of these contracts. The contract includes a schedule of outlets and fixtures for the various rooms of the residence, a general provision being to supply 40-watt lamps and pull-chain sockets. Concealed wiring is invariably specified. An extra page of the contract form is given over to illustrations of typical fixtures, a choice of which is offered the customer. One regulation set of fixtures with the accompanying wiring for an eight-room house is supplied for $49.75.

For commercial wiring the form of contract varies only in the form of schedule of outlets and fixtures, which provides for a greater variety of equipment. In this case no typical installation is offered for any specified sum, but the selection of equipment is left to the customer.

Commercial Growth of Northern States Power Company.

The Northern States Power Company, a subsidiary of H. M. Byllesby & Company, operating plants in Minnesota, Wisconsin and Northern Illinois, is maintaining its past record of new-business gains during the present year. In the two and one-half years ended June 30, the number of customers served advanced from 48,366 to 72,650, a gain of 50 per cent.

At Minneapolis the new-business gains of the first six months of 1915 were better than the new business added during the corresponding period of the year before. The electrical output for the period increased materially. A 65-mile transmission line is under construction to give service to Osseo, Rockford, Delano, Watertown, St. Bonifacius and Waconia.

A contract recently signed at St. Paul calls for power to operate 2,665 horsepower in motors in the Great Northern Railway shops and roundhouse. Service will begin soon to the new railroad building, where the lighting and power demands total 2,100 horsepower, or more than the electrical needs of many cities of 10,000 population. The first artificial ice plant in St. Paul will also be one of the company's new power customers.

St. James, Minn., has decided to close down its municipally operated electric plant and purchase current from the Northern States organization on a wholesale basis, the city doing the local distribution. Contract has been signed and a 14-mile transmission line will be built from Madelia to St. James. Mapleton, Minnesota Lake and Winnebago City are also new customers, the latter city having sold its municipal plant to a private company which will buy current at wholesale.

In the Fairibault territory Eagle Lake has recently granted the company a franchise and a six-mile extension will be run from Madison Lake. The village of Rosemount was recently added to the service and requests for service from a number of other towns are under investigation.

The Elizabeth Light & Power Company, Elizabeth, Ill., has entered into a 20-year contract with the company for its supply of electric energy. High prices for zinc ore have caused unusual activity in the Illinois-Wisconsin zinc mining field, where the organization supplies power to the mines and reduction plants. Recently 200 additional horsepower has been installed in mines, and several hundred additional horsepower are in prospect.

Initial Concentric Wiring Installation in Boston.

The Boston Edison Company has wired three houses with bare concentric wire in the Roxbury District. Data as to the cost of the installations have not been worked out as yet, but it is evident from the hours of labor involved in the last installation, as compared with the first, that costs under this system will be as low as its advocates have forecasted.

In wiring the third house, which has 20 outlets, about 22 hours of workmen's time were consumed in talking with interested visitors and explaining to them the mysteries of the novel system, and also in experimenting and in learning the best and most efficient methods of work.

General Electric Company tinned-copper solid shell conductor was used, with twistons and American fittings. Lights have been turned on in the houses, to the full satisfaction of all parties concerned. It is expected that the special concentric fittings which are being developed by the General Electric Company will be ready for use in the autumn.

Eight houses have been wired under the bare concentric system in Baltimore.

San Francisco Has Largest Electric Sign.

Berry Brothers, varnish manufacturers, have an electric sign at San Francisco which is 100 feet long and 50 feet high. It is said to be the largest in the world. This sign flashes at the rate of over 2,500 flashes per minute. The following information of the sign is of interest: The aggregate candlepower of the lamps used for illuminating the sign totals over 100,000, representing lamps of every conceivable size and color. The electrical construction represents over 75,000 connections and six months' time was required to build and erect the sign. Approximately 550,000 feet of wire and 2,857 switches were used.

The sign operates day and night except on Sundays.

Electric Ventilation for Harrisburg Schools.

The Harrisburg (Pa.) Light & Power Company has invaded a new field, which promises interesting and profitable development, through the adoption of electric motor-driven ventilating systems for the public schools. The first two installations have brought one 5-horsepower and one 10-horsepower variable-speed motors to the lines. The public schools in Harrisburg have heretofore been ventilated by engine-driven fans operated in connection with the steam-heating plant, and during extremely cold winter weather it has always been found difficult to get up sufficient steam to produce satisfactory ventilation for the opening hours of the morning session. The electric ventilating system will eliminate this trouble.

Increased Capacity Galena Power Plant.

Continuously increasing demands for electrical power in the Illinois-Wisconsin zinc mining field have necessitated the installation of a 2,500-kilowatt turbine in the steam station of the Interstate Light & Power Company, at Galena, Ill. The new unit will be installed by the engineering department of H. M. Byllesby & Company, together with a number of improvements in the boiler room. When the work is completed the Galena station will have a total capacity of 10,000 horsepower.

Electric Iron as Premium.

A premium in the shape of an electric iron is offered by the Nashville (Tenn.) Railway & Light Company, to those who during a stated period contract for wiring of their homes. The work is done on the basis of easy payments to run through the year.

Electrical Construction

CO-OPERATION OF THE CENTRAL STATIONS WITH THE ELECTRICAL CONTRACTORS AND DEALERS IN ELECTRICAL SUPPLIES.[1]

By S. V. Walton.[2]

Co-operation, in order to amount to anything, must directly benefit the co-operators and before one would-be co-operator can benefit another he must know him and know something about his problems. Such occasions as this tonight furnish the opportunity to get acquainted with the other fellow, and once the ice is broken, if there is a mutual desire to get at the bottom of things, there is no further difficulty, providing the desire is sincere and each of the parties to the transaction has confidence in the other.

The men gathered in this room represent one of the greatest industries of the age, although yet in its infancy, an industry that undoubtedly will play a very important part in the future development of this great country of ours. I think I am safe in saying that electricity is already looked upon as the servant of mankind, one that never complains and is always on the job, and it is easy for me to imagine how it can be made to serve in countless places where it has not yet been put to work in the various industries, on the farm and in the home.

The business naturally divides itself into two branches—the central stations that supply the energy and the other interests—manufacturers, jobbers, dealers and contractors—that supply, or should supply the devices for utilizing that energy, putting it to work, if you will, so that it will be of some benefit to mankind. The central stations have their problems peculiar to themselves, many of which they have already solved, and the other interests named have their problems. I believe this association of contractors and dealers is maintained for the purpose of solving these problems.

The fact that there are problems that are of mutual interest to the two branches of the industry just named has been recognized for some time and various attempts have been made to bring about the proper kind of co-operation. Some of these attempts have met with success, but more of them have failed, largely because of lack of confidence on the part of one or the other, and as long as this lack of co-operation exists there will be no real co-operation.

W. W. Freeman, of Cincinnati, one of the best known central-station men in the country, in a talk before our Electrical Development and Jovian League, during the recent N. E. L. A. convention, gave a definition of co-operation that appealed to me. He said in effect that real co-operation was working together on equal terms with confidence on each side, for the accomplishment of something that is of advantage to all those interested. He objected to the expression "team work," as that, in his mind, implied the thought of being driven, and no real lasting results can be accomplished unless the co-operation is spontaneous.

It is my opinion, and that of the company I represent, that there exists at this time between the central stations on the one hand and the contractors and dealers on the other, a fairly good understanding of each other's problems, a feeling of confidence on the part of each that the other is going to play the game fairly with all the cards on the table, and for all there is in it, and a mutual desire that is spontaneous to work together, each looking out for and respecting the interests of the other, for the simple reason that by so doing the interests of both will best be served and the industry as a whole be benefited most.

This condition of affairs has not been brought about over night or by any miracle, but by years of patient effort on the part of a few who have long realized the necessity of such co-operative work. I believe the work of perfecting the organization of contractors and dealers has been one of the hardest things to accomplish, largely on account of the large numbers interested and the great diversity of interests, and great credit is due to the men who have worked so hard and so long in bringing this situation about.

Probably the central stations have been to blame to some extent for the delay. I am sure they have not helped as much as they could, but how could they treat with every contractor and dealer separately? They were organized, and it remained for the other interests to become organized, so as to deal with them on an equal basis. I am reminded at this point of a story I read a few days ago, which I think will apply and help to bring out what I have in mind.

"There was a darky down in southern Indiana, who was walking through the fields and had a long blacksnake whip—regular old Missouri eleven-inch tip—and he was so expert he could take a petal off a flower. His friend said to him: 'Can you kill a bee?' With certain deftness he cracked his whip, killed the bee, and then his friend asked, 'Can you kill two bees in succession?' and he took that blacksnake and crack! crack! he killed two bees and then four bees in succession. Finally he struck at a bee up in the tree and he hit a hive, and all the bees immediately started after him. They let his friend alone, for they seemed to know who had done the damage. Well, he dropped his blacksnake and ran, with the bees all after him, and his friend yelled after him: 'Why don't you use that blacksnake?' and he cried back, 'Why, man, those bees are organized!'"

After all, if each of the interests will stick to the job, the central stations to manufacturing and selling to their consumers electrical energy, the contractors and dealers, backed up by the manufacturers and jobbers, to supplying such consumers with devices for consuming the energy, and both working in full confidence in each other to make electricity in the fullest sense the servant of mankind, not only will the interests of both be served, but incidentally the poor consumer will get what he is entitled to, and public opinion favorable to the central-station companies will be created and maintained.

The fact that your association believes in such a policy is evidenced by amendments to your by-laws, several sections of which bear particularly on this phase of the situation, and to make the point clear I will read them:

"It is fully recognized that the economic and proper channel of distribution of electrical supplies is through the

1 Paper read at meeting of California Association of Electrical Contractors and Dealers, San Francisco, July 20.

2 Manager of the Commercial Department, Pacific Gas and Electric Company.

electrical supply jobber to the dealer and contractor, who, in turn, serves the consumer. By this method the dealer and contractor is enabled to have the advantage of a complete stock of electrical merchandise in the warehouse of the jobber which can be drawn on at any time, no matter whether it is one item or a hundred, and can be assured of prompt shipments and satisfactory service from every standpoint."

"The dealer and contractor is the natural channel for distributing various electrical devices to the consuming public. He carries the material in stock and displays it on his counters and in his show windows. The consumer is thus enabled to see the material which he is purchasing and knows that he is getting full value for his money. He can get promptly any information he needs or instructions in the use of the various electrical devices, which is a service that could not be rendered satisfactorily by correspondence with some distant point."

"In order to gain the full confidence of the public in the industry we represent, the class of material furnished and the excellence of workmanship in its installation must be of the highest order. We should never recommend for sale an article in which we have not absolute confidence, and a full knowledge of the functions it will be called upon to perform.

"We should not consider an installation as tending to promote the best interests of the industry, unless it has met with the unqualified conviction on the part of the contractor that it is of the highest class. An installation made by an electrical contractor, simply because it will pass inspection, is undoubtedly bad practice."

The Pacific Gas and Electric Company has recently become a member of your association after a very careful study of the situation, and by so doing has subscribed to your constitution and by-laws with a full knowledge of what they contain. It has, therefore, agreed that the interests you represent should handle the merchandising of current-consuming devices. I do not mean that our company has definitely decided to retire altogether from the business of merchandising such devices as we are not yet fully satisfied that this end of the business can be handled entirely by the interests you represent. I can assure you, however, that our merchandising policy will be such that there will be no objection on the part of any of your people to our continuing in the business. I can say to you gentlemen that in announcing this policy we have absolute confidence in your ability to carry out your end of the bargain, and in your desire to work with us in building up a profitable business.

We are going into this matter with plenty of enthusiasm, and you will all agree with me that with an understanding of each other's problems, confidence in each other and enthusiasm for the job, results that will be entirely satisfactory to both of our interests are sure to follow.

CO-OPERATION BETWEEN ELECTRICAL CONTRACTORS AND JOBBERS.[1]

By W. L. Goodwin.

Some eighteen months ago I was approached by several of our contractor customers who desired to enlist the co-operation of my company toward a betterment of conditions in the contracting business. They desired co-operation toward the end of building up a representative association of contractors. Many discussions followed and it developed that if the support necessary to establish a stronger and better organization of contractors was to be hoped for, it would be advisable to prepare a new constitution and by-laws as well as thoroughly establish certain basic principles on the part of the contractor which would enlist the support of jobbers.

The paper on "Co-operation," which has been read was the result of these conferences. It stands for everything which may be considered as a high ideal for an electrical contractors' association and justifies the support of jobbers in general. I believe that every jobber at least in this section of the country, is in hearty sympathy with the principles of the paper. With this paper as a working basis, much progress has been made to elevate the standard of our business. Other movements to better their conditions among contractors had met with failure, invariably resulting in disruption of the organization due to dissension among the contractors. Unquestionably these failures were due to a lack of a well defined and definite operating basis on the part of the contractors.

Jobbers, recognizing these failures in the past, did not feel disposed to lend their support to any movement which was not reasonably sure of success.

The present constitution and by-laws of the California Association of Electrical Contractors and Dealers, supplemented as it is by the paper on "Co-operation," seems to provide the basis for an association which not only will be the means of improving conditions in the industry but complying as well with the legal objections which present themselves in most association efforts.

The original plans have been followed out almost to the letter and I might say that you have not as yet started on the main structure. You are still working on the foundation, as it were, and in that respect I would caution all members of the California association not to be overanxious for results, bearing in mind that we are in the midst of a period of depression that is almost unbearable, but if we can obtain the co-operation which is evidenced by your presence here and profit by the results of a co-operative effort during such a period through which we are now passing, what will the results be when business generally returns to normal?

The contractors, therefore, must be careful in their local association work as well as in their state association work that they do not ask or expect too much from the various interests at this particular time and that their every act will command the respect of the other interests.

In the development of an association of this kind large interests have to be considered. The central stations, at least in this section of the country, are institutions representing a vast amount of capital, desirous of advancing their own interests, improving their load factor, extending service to consumers in every direction with profit to themselves and without increased cost to consumers.

How can we best work together to bring about this condition in order that all interests may profit, namely, manufacturer, central station, contractor, dealer and jobber.

We have been able to attract the attention of central-station representatives, as evidenced by their presence here tonight. However, you as contractors and we as jobbers realize that we have a great responsibility before us. The problem has been squarely put up to the contractors. The possibilities are here, opportunity evidences itself on all sides if we measure up to qualifications and determine the part we will play in the industry in the future.

If the present movement in California fails, I predict that it will be many years before any other associated effort will succeed and unquestionably many of those present who are now successful in the contracting business will find it desirable to retire to some other business.

On the other hand if we fulfill what seems to be our obligation there is no question in my mind, nor should there be any question in the mind of any jobber, that the electrical business will for the first time in its history be reaching what may be considered a safe and solid commercial and financial institution, something which does not exist in the industry today.

In the work of organization there are many problems to be met. The

1 Paper read at a meeting of the California Association of Electrical Contractors and Dealers, San Francisco, July 20, 1915. The author is vice-president and general sales manager for the Pacific States Electric Company.

various interests, as Mr. Walton in his paper has pointed out, namely, the manufacturer, central station, contractor-dealer and jobber, have been trying for a period of over twenty years to do business absolutely contrary to the methods we now outline. So you can realize that it is not an easy task to change the policy of an organization capitalized in the millions and get them to see conditions from your viewpoint. Having impressed some of the larger interests with the sincerity of this movement, those present representing the smaller institutions should realize the opportunities of the future if it goes on with the success which it has met during the past year.

In this process of development, it is necessary not only to change the policy on the part of business institutions generally, but it is also necessary to change the personal conduct of the individuals in these institutions.

Change of policy will not spell success without the personal belief of the individuals in these companies as to the sincerity of the movement. It is necessary that we elevate the standard of the electrical contractor and dealer; and those who take advantage of the situation, grow up with this movement and qualify with the requirements will succeed. Those who do not, will in my opinion, fall by the wayside and disappear. Our responsibility to the central station is indeed great. In order that the public may be better served it is to the interests of the central station that the dealer and contractor properly establish himself with representative stores and provide for facilities for the distribution of lamps, current-consuming devices, household appliances, motors and other devices which aggregate in volume millions of dollars per year and whether you as contractors and we as jobbers serve faithfully and well or whether we fail to serve faithfully and well is a responsibility which each and every one of us must as individuals assume and collectively prove our ability to render this service. If we do, our success is assured both individually and as a class.

On the other hand, we have had very little encouragement from the central stations generally and to my mind the central station is the one branch of the industry which controls the entire situation. They should assume the responsibility of holding together the several interests. In many sections of the country the central-station management assumes an attitude that they alone are concerned in the success of the industry. The other interests have been almost entirely ignored and as a result a most demoralized condition presents itself in such localities.

The policy on the part of the central station has been such as would offer no encouragement to either contractor or dealer. The insane desire to increase their load has been at the cost of almost every other branch of the industry. Unless the central-station management recognizes that the business of the contractor and dealer is just as legitimate as his own and that they should both work together for each other's interest, antagonism on the part of each is bound to result. Municipal ownership, as inefficient as it is, will ultimately predominate.

It behooves managers of central stations to look far into the future and to make some effort to improve the condition of the contractor-dealer.

Fortunately for us of the West, or at least in this section of the country, central stations realize that the other branches of the industry can assist them in increasing their load on existing lines and consequently improving their load-factor, and to this extent are encouraging the contractors and dealers in the establishment of representative retail stores from which the consumer may be served.

Central stations generally recognize that their prime responsibility is in the sale of energy, and it should be recognized that when they involve themselves in the sale of current-consuming devices they do so with two ideas in mind; first, their belief that they can add to their lines increased current, and second, that the dealers generally are not in a position or have not proven their ability to render this service for them.

To the representatives of the National Electrical Contractors' Association who are here from other sections of the country and who may not be so positive as to the success of this movement, let me give you this thought. What is the bonus to be gained if the movement does succeed; and is it worth while? Except in isolated sections, particularly in some of the larger cities, further associations of contractors must look for their membership in numbers to the combination contractor and dealer.

True, in the larger cities you will always have the specialists in straight contracting work, but the combination contractor and dealer is the institution who will make up the bulk of your membership and to whom you must look in order to produce for the central station that which it requires, namely, the proper serving of the public in lamps and current-consuming devices. If this be a fact, and I think that we all admit that it is, careful consideration must be given to the small dealer in order to bring him up to a standard where he can be of value to the organization.

I think we will admit that the contractor-dealer has been deficient in some of the vital things necessary to the conduct of any successful business. His general business methods have not been up to standard. His credit rating is very low and the caliber of men attracted into the business has not been all that we would wish for. The stock carried has not been representative and has not been of the nature that interested consumers generally. Methods of figuring prices have been such that success was impossible.

If the busines can be placed on a solid foundation where financial success is assured and the standard is raised, a more desirable class will be attracted to our industry. By reason of the great progress which is being made in the industry it constantly requires new capital in all branches to take care of development. Annual earnings are not sufficient to provide for increased business and capital will only be attracted to an industry that offers reasonable assurance of a proper return on investment.

This has not been possible in the past, either from the standpoint of the contractor-dealer or jobber. The selfish interest of each branch of the industry has long been responsible for conditions as they now exist, and these conditions will only be improved as all of the interests work together for the common good.

As I have pointed out, one of the great difficulties which jobbers have had to contend with in their dealings with the contractor is the lack on the part of the contractor of a definite and well defined business policy.

How many contractors present here tonight have a well defined policy which they follow from day to day without regard to the consequences? Institutions that operate without a policy, drifting along from day to day and week to week without knowing what they are doing and how they are doing it, will not long succeed. That has been the trouble, generally speaking, with the contractor. They have no definite policy either in the purchasing of material, in their methods of figuring work or the manner in which it is installed. Nor have they any idea of initiating campaigns to produce business. It has also developed that many contractors have not contributed to the uplift of the industry to an extent that will justify their existence. I mean by that that the contractor cannot justify his existence in the electrical industry if he is to sit

in his office waiting for a set of plans to be figured, submitting a figure and upon being the low bidder proceed to do the work. This is like the shopkeeper who stands behind the counter waiting for a chance customer to drop in. Any institution that continues along such lines is bound ultimately to be eliminated. Each one of us must create a certain amount of new business. The contractor certainly must do his part. That has been and still is the objection of the central station to developing the contractor, and while I do not want to appear to be complaining about any particular contractor, I simply want you to get that thought in order that you may realize that if you are to maintain your place in this movement, you must do some creative work. It is not necessary to outline how creative work can be done. That is a simple matter. It is clearly understood by any wide-awake institution. The representative of any central station, manufacturer or jobbing institution will give you many ideas for the development of new business.

Now with reference to the organization of contractors and particularly to those members of the National Electrical Contractors' Association who are present this evening. The contractor organizations in the United States remind me very much of the story of the doctor who was a golf enthusiast, and who had as his caddy an old Scotchman. After a time the old man became ill and called upon the doctor to prescribe for him. Knowing the old man's weakness for strong liquor and realizing that he must prescribe something along that line, he suggested two pills and a dram of Scotch whiskey to be taken every night for five or six days. He asked the old Scotchman if he had been faithful in taking his medicine, to which the old man replied: "Well, I am about five days behind with my pills, but I am five days ahead with my whiskey." That is about the status of your contractor organization today. You are years ahead with your national association, but years behind with your state and local associations.

I would suggest to the members of the national association that they encourage first the formation of local associations, consolidated into state associations, which may be one or more in each state, and through a per capita tax of the state association draw their membership into the national association. By such a method there can be added to the membership of the national association in a very short time 5,000 members. I believe we of California can deliver to the national association, under such a plan, in the neighborhood of 300 or more new members. I would suggest that at this meeting you consider the advisability of the appointment of such committees as may be necessary to provide amendments to your by-laws to provide for this condition. With such a good, strong state association in California, representation in the national association is far below what it should be. Every member of the state association should be a member of the national association, and I believe this condition will prevail in the very near future.

I believe that the meetings of the national association held only annually are not of sufficient frequency to keep pace with the times. The industry is advancing out of all proportion to your organization, and something must be done to provide at least quarterly meetings of some character. That, of course, is impractical with the national association as it exists today, but there should at least be meetings of your directors or executives who are directing its affairs. Quarterly meetings are, however, practical within the state associations, and in that way greater progress can be made and the national association can individually take up the problems which may be discussed in the state meetings.

Jobbers generally throughout the country should, and I believe do, recognize that contractors and dealers, by reason of the position they occupy, are entitled to recognition in some manner, a condition which has not prevailed in the past. I believe that almost every jobbing institution in the country today is giving much thought to this subject.

Manufacturers also are beginning to realize that not only is the jobber necessary to the progress of the industry, but likewise the dealer and contractor is essential for the proper distribution of their products. The Industry is entirely too young to even consider the elimination of either of these interests, and the further we progress the more justified is our existence.

The reason that the contractor has not had proper protection in the past has been due to a lack of organization of his craft. You have not presented a unity of strength and proven by a united effort your ability to handle the problems which face you. You have not been a unit as to what you wanted, and until you are you cannot hope to gain much.

As a jobber distributing the goods of manufacturers, I must have protection on the part of the manufacturer, and I likewise recognize that the contractor-dealer is entitled to similar protection. Such protection to the contractor is not only desirable, but is essential to his ultimate success. Protection will come only when the contractors themselves, by their conduct and their ability to serve the consumer, justifies their protection.

Protection will come much quicker if the contractors present not only a united strength, but prove as time goes on that they are capable both in their commercial dealings and their financial rating to meet the problems which face them. The industry may be retarded, but not brought to a standstill because of the inability of any individual or class to perform their proper obligations.

Another point which I would like to impress upon the contractors is their almost insane desire to obtain price advantage over competitors.

I happen to know that many of the larger contracting concerns of this country believe that the position they occupy and their future success depends entirely upon a price advantage over their competitor. That unquestionably is a wrong impression, and the sooner the contractors realize that a uniform price to all will be for their best interests, the sooner we will reach our goal. One-half of the time spent in creating new business, in producing satisfactory work and satisfied customers, would result in greater returns to the contractor than does his present endeavor to gain price advantage.

It is absolutely essential to the life of any sound business that prices should be standardized. Our great concerns cannot continue in the manufacture of high-grade articles unless the retail price to the public can be maintained. Any endeavor on the part of commercial institutions to obtain in the sale of their product a reasonable and satisfactory profit has been looked upon by the government officials as an illegal combination in restraint of trade. With one arm they wave such aside as destroyers of public morals and with the other arm they are enacting laws which eventually not only control, but legalize on the part of the government, compulsory price maintenance. In every department of the government price maintenance is in order. Try, if you will, to purchase from our government anything which it has to sell at reduced prices; endeavor, if you please, to purchase postage stamps at reduced prices, or endeavor to transmit articles by parcel post at price advantage over your competitor. The government compels the railroads to name one price for all. Within the several states competition between public utilities has been so severe as to make

investments unprofitable to all. The creation of our state railroad commissions was brought about to eliminate this condition. The public realize that price competition results in good to no one and through the creation of these state commissions authorize them to first establish rates at which the utility companies may sell their product to consumers, determine the minimum rates at which their bonds may be sold, authorize the issuance of bond issues and so regulate and control them that not only the utilities are reasonably assured, under efficient management, of a proper return on investment to its stockholders, but protects them against ruinous competition. Both the utility and consumer is today profiting by such regulation.

Our governments, national, state and municipal, are fast coming to the point where they recognize that combinations of business institutions within certain limitations are justified, and I believe that in the activities of our new Federal Trade Commission the big institutions of this country will see the light of day as they have never seen it before.

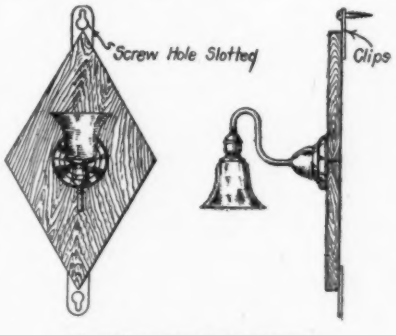
In this respect we are fortunate in that we will shortly be visited by representatives of the Federal Trade Commission. I hope that they will look into the activities of this present co-operative association movement on the part of the contractors, and that when they know the details under which this present movement is progressing and when they know the results that we hope to accomplish and how we hope to accomplish them, that they will consider this not only a step in the right direction, but that such associations are not only right and proper, but that they are absolutely essential to the very life of the American business institutions.

We all recognize things we have had to contend with in the past, that is to say, that each branch of the industry has operated without regard to the other branches of the industry. From the paper which Mr. Walton has read, you should recognize that you have with you a representative of a central station that is composed of individuals with souls, men whose reputations in the community are unquestioned. They have evidenced on the part of their company a desire to assist you in this work, and I hope they will be able to enlist the co-operation of other central stations in this commendable movement.

During the meeting of the National Electric Light Association in San Francisco last month I had an opportunity to talk with many of the representatives in attendance. I pointed out to them how the industry could be advanced with their co-operation, how the central station can elevate the standard of the electrical contractor and dealer by helping him solve his problems and by encouraging him in the merchandising end of the business with a willingness on the part of the central stations to assist him in solving these problems, and now, gentlemen, I trust the encouragement you will receive on the part of the jobbers generally, and unquestionably on the part of manufacturers, will inspire you to greater effort, and you should return to your homes with the thought that your time spent in California has been more than a pleasure jaunt and that you may realize that the future holds in store for you a condition such as was never anticipated even under the most ideal conditions.

Showing Bracket Fixtures.

Instead of the old-fashioned way of screwing bracket fixtures to the wall of the show room, we mount ours on a diamond-shaped piece of wood, stained dark, flat finish, and put a clip at each end so that the whole block and fixture can be readily reversed to show the fixture



Mounting Bracket Fixtures.

with the lamp pointing up or down, as many brackets look better pointing up than down. E. M. Raetz.

Cincinnati Contractors Hold Picnic.

Wednesday, August 4, was set aside as the annual outing picnic of the Electrical Contractors' Association of Cincinnati. There was a good turnout of contractors from the city and vicinity. The party assembled at 9 a. m. at Fourth and Sycamore Streets and proceeded by automobiles to the beautiful grounds of the Ivanhoe Club, Perintown, Ohio. After an excellent country dinner and short rest the annual baseball game was held; the contestants were A. G. Sturtevant's Socket Sellers and Al Beattie's "Carpet Baggers." William B. Hubbell acted as umpire. Following this exciting game there came refreshments, boating and bathing, more refreshments and, late in the day, the return to the city.

Among the Contractors.

The partnership known as the Bothwell-Guthman Electric Company, 15 Spring Common, Youngstown, O., has been dissolved, J. Howard Bothwell purchasing the entire interest of Irvin W. Guthman. Mr. Bothwell will continue the business at the same location and will shortly incorporate under the name of The Bothwell Electric Company.

The commissioners' court of Dallas County, Texas, has awarded the contract for rewiring the old court house to the F. E. Newberry Electric Company, of Dallas, at $7,000.

Contract for installation of the "white way" system which has been decided on by the Board of Commerce, of Lexington, Ky., has been awarded to the Harry I. Wood Company, of Louisville, and work will begin as soon as possible. The representatives of the Board of Commerce are getting the names of the individual members of the board to the contract after which work will begin. The plans provide for a total of 97 standards to carry two lamps each.

The Harry I. Wood Company, Louisville, Ky., which took the contract for wiring the plant of Gamble Brothers, lumber workers, in Highland Park, extended the original contract by suggesting to the firm the advisability, since the workmen were on the ground, etc., of wiring the plant for electric lighting, current to be supplied by the company's own equipment. This is a nice job and desirable, coming as it did. Conduits are being installed throughout and Mazda lamps will be supplied.

Various good contracts are being executed by the Wood Company. One is for installation and wiring of a group of buildings for W. C. Martin, who will use a part of the plant of the old Falls City Woolen Mills on Preston Street as a broom factory, renting the other buildings to power users. The Wood company is installing a 220-volt three-phase alternator and exciter and switchboard here, the equipment throughout being Triumph.

This week the company began execution of the contract for wiring the freight and passenger station of the Louisville & Nashville Railroad at Lewisburg, Tenn., which includes 17 standards in the yards. The Lexington "white way" job will be begun about the middle of September, and will keep a crew busy for 60 days. Other contracts the Wood company has out in the state include that for the new First National Bank at Paris, and a telephone system in the Price Memorial Hospital at Harrodsburg, Ky.

Dollar Wiring Kinks.

Every reader is invited to contribute to this column. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; and if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Extension for Breast Drill.

In wiring back of switchboard panels it is often hard to use a brace or breast drill on account of studs, busses, supports, etc. I have found the tool illustrated here to be of great use as an extension for one-fourth-inch drills, the standard size for expansion shields and lead "slugs" for fastening cleats with wood screws. It is made up of a piece of three-eighths-inch round steel, 12 or 18 inches long. One end is turned down to fit chuck of brace; the other end is centered and drilled out with a one-fourth-inch drill to a depth of nine-sixteenths inch and then slotted, as shown, in order to fit the shank of drill. This is simply an ordinary one-fourth-inch twist drill with its shank ground, as shown. This can be done on an emery wheel. The slot in extension also allows drills to be easily removed after using.

Extension Piece for Drill.

H. W. Parsons.

Hanging Fixtures Plumb.

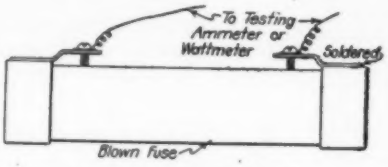
Owing to crooked threads and uneven plaster it is often very difficult to hang a fixture plumb. I always carry a few pieces of thin lead casing from twin cable in my tool bag for the purpose of wedging the crowfoot or fixture studs out. By placing a few pieces between the bottom of the box and the stud or crowfoot (as the case may be) the screws can then be screwed up, pressing the crowfoot into the lead until the fixture is plumb.

Bert Wicker.

Testing Motors.

In tests of motors, using ammeter and wattmeter connected in a cabinet or other fuse junction, I make use of the device shown in the accompanying illustration.

Take a burnt-out fuse of the same capacity as the cutout and solder a terminal on each end as shown. Connect the ammeter or wattmeter leads to these terminals and insert the device in place of the regular fuse. This puts the ammeter or wattmeter in series with the motor. In order to maintain protection in the circuit, a fuse should be inserted at some other point.



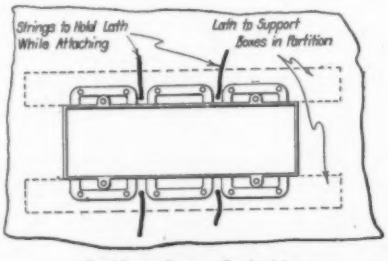
Old Fuse With Terminals.

This scheme obviates the necessity of disconnecting the motor or disconnecting any of the wires in the cabinet.

William E. Estlick.

Setting Switchbox in Plasterboard.

I was called upon to set a three-gang switchbox in a plasterboard wall the other day and there being no lath to fasten my boxes to, I struck upon the following idea. First measure and cut out a hole in wall to take your boxes, then get two pieces of lath a little longer than box and drive a finishing nail through about a third of the way from each end on both, then pull a piece of twine through all four holes and knot the ends. Then punch or drill very gently four holes in wall for twine to come through. Next set your box in after pulling in wires and screw your boxes fast while you are holding the lath solid with twine. When you have all the screws in and switches set cut your strings and your plate will cover the strings' holes.



Setting Gang Switchbox.

Ernest Knierim.

Emergency Locknut.

A good substitute for a locknut is to saw about one-fourth inch off of a coupling.

E. A. Shoemaker.

Oil-Can Spouts.

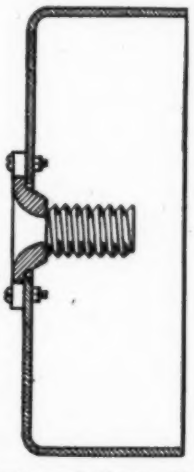
Recently in oiling ceiling fans I had occasion to use a long-spouted oil can, and having only a short-spouted can in my kit, I used the following scheme with good results. I inserted a piece of bell wire in the nozzle of the can. The oil then ran along the wire to the place I wished to oil.

W. A. J. Hahn.

Fastening Fixture Stud.

Ordinarily the fixture stud is fastened with nuts and screws to the inside of the back of the outlet box. I have found it advisable to drive out the center knockout of the back of the box and pass the threaded part of the stud thru this opening, so that the legs are on the outside of the box, and then fastening with nuts and screws in the usual way.

This makes a strong support for heavy brackets and permits an easy adjustment of the stud by means of the screws.



Mounting of Fixture Stud.

Joseph J. Drucker.

An Emergency Compass.

Often on a repair job and especially motor work, the use of a compass is imperative and one is not always to be had immediately. I have several times made use of the following device which with a little care can be used in place of a compass.

Magnetize a short length of steel wire or a large needle; mark one pole the north-seeking pole; run the steel through a small flat cork, having each end beyond the cork equal. Put the cork in a saucer or a glass of water. While this device will not act as quickly as a compass it will answer the same purpose and the material can be found and device made in less time than is necessary to send for or procure a regular compass.

Robert Oster.

Public Service Commissions

Conducted by William J. Norton

INDIANA.

Merchants Heat and Light Company. The decision of the Commission upon the investigation of the rates of the Indianapolis Light and Heat Company was reported in last week's issue (ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, August 7, p. 235). In that connection brief mention was made of the companion decision affecting its competitor, the Merchants Heat and Light Company. Both decisions were handed down on the same date, July 30, 1915, and the same rates were established for both companies. The order in the Merchants Company case contained rules for measuring radiation in the hot-water heating plant. The company now has three central stations from which is supplied hot-water heating and steam-heating service and electric service. The Commission says that the situation is a complicated one, rendering difficult the apportionment of costs between the three services, and that it is further complicated by the necessary changes in the plant and equipment which are now underway, in preparation for the furnishing of municipal lighting service.

Municipal Lighting Service.—In regard to the municipal lighting service the decision says: "It appears from the evidence that the power load of the company is much greater than its lighting load and that the municipal lighting if carried in addition to the present commercial lighting will not make the night load of the plant as great as the present day load except that it may raise the present early-evening and late-morning peak somewhat. This municipal lighting has been referred to by the defendant's engineer as a by-product, but we regard it as entitled to bear its due proportion of the operating and fixed charges of the plant. The difficulty at this time is to determine what that proportion is or rather may be."

* * *

"The municipal lighting being wholly a matter for future development we will assume that the rate fixed by the defendant and the municipality is fair to both parties and pass that part of the case by without consideration. In fact no question of the fairness of the rate was raised on the hearing and it could not well have been presented since the service was not to be installed for some time and the equipment was then being constructed and placed and could not then have been satisfactorily valued."

Rate Theory.—The Commission does not go into an extended discussion of the various elements in the valuation as was done in the case of the Indianapolis company, but concludes that a fair value of the property of the Merchants company used and useful as of June 30, 1914, including going value, supplies and working capital is $2,000,000.

Taking up the problem of rate-making, the decision says:

"Electrical engineers have given much thought to the matter of developing and devising fair and scientific rates for electric current.

"They have by various processes deduced rules whereby they assume to determine accurately and scientifically just what is a fair rate for each user of current furnished by an electric utility. These rates are made on the theory that the actual cost of producing whatever amount of current or electrical energy any one patron may use in a given time can be ascertained. These costs include the operating expense or cost of generating and distributing the energy, a fair return on the investment, the amount of which is measured by the value of the tangible and intangible properties of the utility, and a depreciation fund which is provided for the purpose of and should be sufficient to replace the plant when the same may become worn out or obsolete."

Cost Theory.—"By this method of rate-making it is attempted to allot to each patron his proportion of whatever sum would be a fair income on the amount of the investment which has reasonably been made and such part of the operating expenses as necessarily must be incurred in order to begin supplying such patron with electricity, plus a proper amount to be set aside as a depreciation fund and which is necessary in order to replace and repair the plant and keep it in a condition that will enable it to continue to produce electricity. The patron's proportion of this sum is determined by ascertaining the proportion of all the current he would use in a given time to the whole amount that all the patrons would use or 'demand' during the same period of time. To this demand charge is added the cost of generating whatever quantity of current may be actually used by the patron.

"A third step is sometimes introduced which is denominated the customer's charge. This charge is fixed by calculating just what part of the operating expenses are made solely for the benefit or on account of the individual customer and charging him directly with the same in addition to his demand charge. This customer's charge includes cost of reading meter, entering the account on the books, sending statement, collecting account, work on customers' premises and many other refinements of division and adjustment, all of which are assumed to be precisely the same on account of each customer and this without reference to his demand or the amount of energy used. This charge being deducted from the operating expenses greatly reduces the cost of generating the energy and by a liberal transferring of operating expenses to demand and customers charges the apparent cost of generating energy is very low. The manifest tendency and intent of any reasoning or analysis of cost conditions which increases the demand and customers' charges is to reduce the cost per measured quantity of energy production and this inures to the benefit of the customer who uses a large amount of energy.

"No doubt if accounts were so kept in operating an electric utility that these several factors entering into a rate could be exactly determined a rate or charge based on actual cost, with that cost including an income on the investment, might be accurately worked out.

"The minuteness of detail which would be necessary in attempting such a task in accounting would make it impractical. The course pursued is to apportion the cost of reading meters equally between the customers and also the cost of collecting the customers' bills, and services on the premises and the income return on the cost of the meter and services and the material and labor in installing the same. This is so done for the reason that the keeping of an individual account showing these expenses in detail against each individual customer would be prohibitive on account of the expense of doing it. It could not be possible, however, that the costs and expenses would be equal as to each and all customers of any utility for these various items. There might not be a great difference and there will be some difference in favor of some customers as compared with others and this slight difference repeated each month would amount to a substantial difference in a year. So that the best that can be said for any of these scientific rate-making theories is that they are approximately correct. We have no criticism to

make of any of them. They are the most nearly correct of any thing that has been brought to our attention, but they are far from being absolutely so. In addition to the inequalities above referred to in distributing demand and customers' charges it can be said that the cost of distributing current to customers is not and cannot be the same per unit to each and all. There will be a greater loss by leakage and in transformers when the customer is five or ten miles from the power plant than in a case where he is only one square away.

Value-of-Service Theory.—"There is and will ever be a certain and not inconsiderable amount of the arbitrary factor in rate-making. Notwithstanding the recent revulsion against the old practice of ascertaining what the business will stand, we still have that element with us in determining what should be charged for a utility service or commodity. And it is the presence of that very element that has caused the scientific or cost theory of rate-making to go to the farthest limit in shifting costs away from operation into demand or customer charges in trying to retain the substance without the form of this element. The defendant company has a rate schedule on file with this Commission making a rate of 7.5 cents per kilowatt-hour for the first 200 kilowatt-hours during the month for lighting and 4.5 cents per kilowatt-hour for the first 200 kilowatt-hours during the month for power.

"It necessarily costs just as much to generate the 200 kilowatt-hours for power as it costs to generate the 200 kilowatt-hours for lighting, and the only reason for making the difference in favor of the power rate is an arbitrary one, because the business will stand the rate in the lighting case and will not stand it in the power case. And this is so because the power user has steam power that he can use and put in competition with the electric power. In order to justify this arbitrary measure it has become customary to speak of that part of the current distributed for power as a by-product which may be sold at any price it will bring without doing violence to the rights of any one.

"That is, we consider the electric lighting plant to have been originally constructed solely for the benefit of the light user, and that he is primarily liable and must see to it that a profitable income is assured. After that is assured the generator may be kept running at times when little if any lighting is demanded, or in excess of the lighting demand when current is being used for lighting, and the current thus generated is just so much clear gain which may and should be sold for whatever it will bring and the proceeds of such sale placed in the general operating income and thereby enable the utility to reduce the cost to the lighting customer.

"This sounds good and would even be good logic if it did not occasionally become sophistry.

"It inures wholly to the benefit of the lagging customer to the detriment of the pioneer. The man who moved first and made the electric lighting plant possible must forever carry the burden and allow the one who comes in at the eleventh hour not simply equal but far greater benefits than he receives."

Power Service.—"The defendant company had on the first day of July, 1914, a connected power load nearly five times as great as its connected residence lighting load and an active connected power load thirteen times as great as the active residence lighting load.

"It does not appear entirely right to consider the aforesaid light user as the one for whose exclusive benefit the plant was constructed and the power user as a benefactor who is doing a benevolent thing in using a large wattage of current at whatever price he is willing to pay and thereby lighten the load of the light user by that much."

Lighting Service.—"The domestic lighting schedule should have its full share of the arbitrary factor in rate-making. Just as it is found necessary to reduce the price of energy supplied for power in order to meet the competition of steam power, so it is necessary and manifestly right to arbitrarily reduce the lighting schedule below what is scientifically determined by the aforesaid plan to be actual cost, in order to prevent the light patron from being driven off the circuit by prohibitive rates.

"Assuming that the demand rate can be worked out so as to very nearly apportion to each patron the exact cost of serving him and that each patron ought to pay the actual cost of his service if it can be ascertained, yet the fact remains that rates for electric lighting and power have been built up on 'what the business would stand' theory. This early method of fixing rates is now discarded by most economists, but it has not and can not at this time be wholly eliminated. It is found in all flat meter rates of electric lighting plants, and is in fact the popular rate and the only one which all patrons of a lighting plant can understand. It is conceded by the defendant company that the so-called demand rate while being more nearly correct so far as ascertaining the actual cost of each customer's service is concerned, is not a practical rate to be applied to domestic lighting for the reason that the demand would be so great in many instances that it would be prohibitive. And the petitioners suggest a flat meter rate in which the demand or ready-to-serve charge is distributed throughout the schedule, not scientifically correct, but by commingling the actual demand with 'what the business will stand' making a compromise rate that will be practical and fair. The defendant has had such a schedule in force so far as we know during all of its existence, and we believe such a schedule should be continued for the use of those patrons who desire service thereunder. * * *

"In this plant the power user is the predominant factor. The plant has been built up for him and there can be no justification for calling his service a by-product and selling it to him for less than actual cost and forcing the price of current sold to the domestic consumer to the highest point it will stand in order to make the income account show a net surplus. * * *

"Power rates have been beaten down to the low point by competition with other power so that we do not feel that it would be right or proper to make a reduction in these rates unless the revenues of the defendant were sufficient to allow a substantial reduction in all classes of service." * * *

Conclusions.—The Commission says that the company's income does not justify a reduction in all the rates of the defendant. The competitive situation which has existed in Indianapolis has brought the rates to a comparatively low level. "The greatest evil that has resulted from these competitive conditions is such as result from like conditions everywhere, that is, discriminations whereby favored customers secure rates below what is really justifiable and those not so favored are required to pay an excessive rate to take care of the losses caused by the favored customers' charges." * * *

The chief aim in adjusting the rates has been to eliminate this discrimination, and the Commission says that by cutting off the lower or discriminatory rates a slight reduction can be made to those who are paying the higher rates.

New York Commissions Issue Joint Order.

For the first time in the history of the Public Service Commissions of New York State a joint order was adopted last week at a joint meeting of the two Commissions, the meeting being held at the office of the Commission for the First District, New York City. The joint order provides for the removal of grade crossings and other obstructions. It also orders a shifting of the tracks and the construction of a viaduct to carry the street. Mount Vernon is in the Second District, and the improvements there were ordered some time ago by the Second District Commission, but owing to conditions in New York City, just south of the Mount Vernon line, the new highway there could not be used until a connection from the New York City end was provided; and the joint order is to bring about the completion of the improvement on the New York City side.

Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 296.—High Cost of Rendering Bills.—I understand that in the case of some of the large central-station companies it costs on an average from 16 to 18 cents to render the ordinary monthly bill for current used. What is the reason for this high cost? What efforts have been made to reduce it?—D. L., Chicago, Ill.

No. 300.—Fire-Extinguishing Materials.—How do sawdust and carbon-tetrachloride compare with each other and with water and with sand for extinguishing fires in varnishes, transformer oils, etc.? How do the two substances first named act to quench a fire?—H. D., Chicago, Ill.

Answers.

No. 289.—Combination Electric Radiators.—I have just heard of a newly patented electric radiator which resembles a hot-water radiator and has an electric coil heat the water in the pipes; it is said to be more economical than a straight electric radiator. I fail to see this and should like to have it proven.—W. T., Cleveland, O.

The intensity of the heat radiated by the electric radiator is often much greater than the circumstances require, and particularly so since the psychological effect of the evident warmth may be produced even by a very mild degree of heat. Consequently, if the intensity of radiation from a heater turned on for only a short time could be partly bottled up and slowly distributed, the effectiveness of the heating apparatus might be greatly increased. This has been demonstrated in allied lines both by the so-called gas-steam radiators (in which water is warmed or even vaporized by the heat of gas flames and then slowly parts with its latent heat) and in gas heaters in which the flames traverse crevices in vitreous blocks which radiate the warmth long after the gas has been turned off. The radiator referred to by W. T. probably operates on the same general principle, viz., that of imparting the heat rapidly to a considerable mass of material (such as water) having a high specific heat, from which heated mass the warmth may be gradually radiated after the current has been turned off. Such a radiator, while not any more efficient than what the inquirer calls a "straight" radiator, as far as the conversion of electric energy into heat is concerned, may easily be more economical wherever a quite moderate radiation is ample if prolonged over a considerable period of time.—A. S., Chicago, Ill.

No. 292.—Sunspots, Magnetic Storms and Weather.—A short time ago a statement appeared in the newspapers that an exceptionally brilliant display of the aurora borealis was connected with great activity in the sunspots and that it also produced serious disturbances on telegraph circuits and magnetic compasses and accounted for our prolonged rainy weather. Has any definite conclusion been reached by astronomers, meteorologists and other scientists as to the interconnection of these phenomena? Is there any basis for ascribing an electrical or magnetic relation between them?—F. L., Beloit, Wis.

The present state of knowledge as to the nature of sunspots and their relation to the aurora borealis and magnetic storms on the surface of the earth seems to prove beyond doubt the electromagnetic nature of these phenomena, which have been elucidated mainly by the electron theory. Already in 1879 William Crookes found that electrically charged particles, electrons, as they are now called, are emitted by a hot body when under sufficiently low pressure. Since the sun is now an eminently hot star and the surrounding pressure of the universe very low it could, with great certainty, be assumed that electrically charged particles (anode and cathode rays) are emanating from the sun's surface. Now if such electrically charged particles are revolving with great velocity they produce a magnetic field just as a current flowing in a helix of wire produces a magnetic field. If, therefore, a proof could be found that magnetic phenomena are connected with the sunspots it would be evidence for the exactness of above assumption. The discovery of Zeeman of the doubling of the lines of the spectrum by a magnetic field delivered that proof. The investigations of Hale and other astrophysicists with the spectro-heliograph have shown indeed that certain lines of the solar spectrum are doubled in the spectrum of the sun's spots. From deduction of terrestrial phenomena of the same nature and their measurement it was even possible to determine the field strength of the magnetic fields produced by the sunspots. These latter are therefore huge vortices of electrically charged particles emitted by the sun and rapidly rotating, extending far upwards into the so-called photosphere of the sun.

After what has been said the aurora borealis is a natural consequence. The electrons emitted by the sun contain also cathode rays and when these penetrate into the magnetic field of the earth they are subjected to deflections towards the magnetic poles. This is like the phenomenon which is brought about in the Crookes tube, the evacuated tube being represented by the thin atmosphere in the upper regions where the cathode rays become luminous and produce the aurora borealis. Birkeland has succeeded in reproducing this phenomenon in a laboratory experiment and a mathematical theory of it was given by Stoermer; an abstract of both appeared some years ago in the *Scientific American*. The electromagnetic nature of the aurora borealis thus being established it is comprehensible that this will have an influence in the magnetic phenomena on our earth. The earth can be taken not only as an enormous magnet, but also as an electric conductor together with its atmosphere, rotating in the magnetic fields set up by the sunspots. It has been observed that electric currents are constantly flowing in the interior of the earth which are ascribed to the outer magnetic fields. These currents show similar slight variations as the magnetic components of the terrestrial magnetism. But if now, due to a certain activity in the sunspots, a sudden and heavy variation in the outer magnetic fields occurs, it is evident that just as in ordinary electric circuits surrounded by magnetic fields a variation of the otherwise steadily flowing current must be produced either by induction or by alteration of the resistance in the circuit, which is due to the ionization of the air by the cathode rays. So not the aurora borealis directly, but the activity in the sunspots which causes the former, will cause also the heavy magnetic disturbances known as magnetic storms, which affect sometimes seriously the telegraph and telephone service.

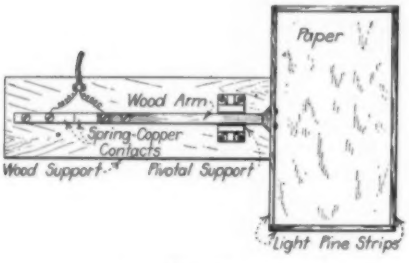
The relation between sunspots and weather has not yet been so firmly established as the other phenomena. The sunspots have in their maximum and minimum number a period of about eleven years and a coincidence of the minimum of the sunspots and a maximum of rainfall seems to have been observed. This, however, is not yet generally accepted, and much more material must still be collected on this subject in the meteorological stations of the earth.—H. A., Pittsburgh, Pa.

No. 294.—Alarm for Air-Blast Transformers.—A railway substation has a bank of air-blast transformers that are now unprotected against failure of the forced ventilation at times of heavy load. What is the simplest and most reliable alarm system for this purpose?—N. P. C., Indianapolis, Ind.

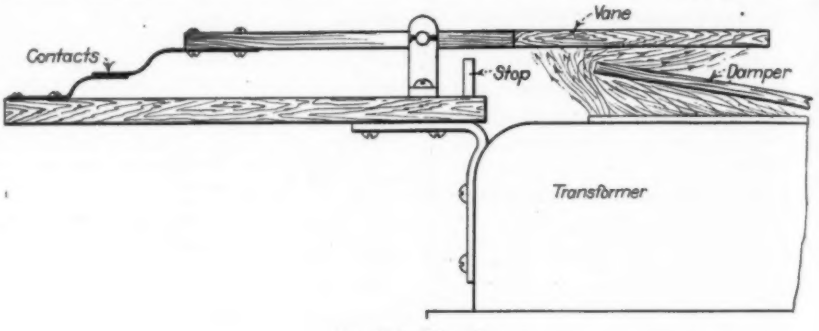
It is generally customary for manufacturers to furnish an air gauge with each air-blast transformer, which generally consists of a U-tube, or water tube, with a graduated scale showing the air pressure. Of course, this is simply a

visual indicator and has to be observed rather closely. For giving an alarm in case of air failure, both visually and by means of a gong, the arrangement shown in the accompanying illustrations will give satisfactory results. It depends upon the current of air passing out of the upper damper of the transformer for operation.

The device for making contact and giving an alarm in case of air failure is shown in Figs. 1 and 2. The latter figure shows how it is attached to the transformer case. The device consists essentially of a vane made of light pine strips and paper, which is attached to a movable arm capable of closing a circuit through a system of signals. The length of the vane should correspond approximately to the dimensions of the damper opening and the width should be about half the length. The vane and movable arm should be so balanced that the current of air under normal conditions will keep the vane raised and the contacts closed. To get the proper balance small counterweights can be attached at either side of the pivotal support. The paper used for the vane should be shellaced and glued to the wood frame.

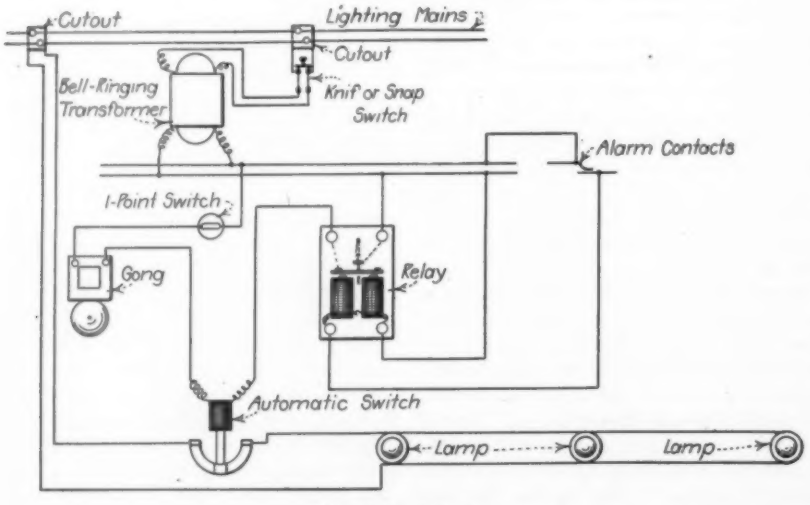


No. 294.—Fig. 1.



No. 294.—Fig. 2.

Fig. 3 shows the connections for a combination lamp and gong alarm. The contacts of the alarm device are connected to the electromagnets of a pony relay, current being supplied from a bell-ringing transformer. The relay contacts are arranged to close the secondary or signal circuit when the armature is released by the opening of the alarm contacts. This closes the circuit through a vibrating gong and an automatic switch. The latter controls the circuit containing several red incandescent lamps which may be located in different positions for sightliness. When the air fails the vane drops by gravity and opens the main contacts at the transformer. The relay releases the armature and the contacts of the secondary circuit are closed, operating the vibrating bell and the automatic switch. The latter closes lamp circuit and lights the red lamps. For the sake of convenience, it is well to insert a switch on the primary or the secondary side of the bell-ringing transformer as indicated by the diagram of connections. The alarm can, by means of counterweights, be arranged to operate at maximum and minimum pressures. It is the practice ordinarily to use about 150 cubic feet of air per minute per kilowatt of loss, the air being forced through the transformer at a pressure of from 0.5 to 1.5 ounces per square inch.—N. G. M., Auburn, N. Y.



No. 294.—Fig. 3.

No. 297.—Electric Stabilizer for Steamships.—I have heard that motor-driven gyroscopic stabilizers have been used with success on some German steamships to diminish their rocking during violent storms. In view of the appalling disaster to the Steamship *Eastland* in the Chicago River on July 24, would the use of such an electric stabilizer have prevented the rapid listing of the boat and been more reliable than water ballast?—T. M. E., Evanston, Ill.

As the actual cause of the *Eastland* turning over is not definitely known at this time, it would be premature and unwise to attempt to say that a gyroscope would have delayed the disaster. The indications are that under similar conditions, but less extreme, a gyroscope would have materially delayed, and perhaps have prevented, such an occurrence.

The *Eastland* overturned because it was top-heavy. The load may have been normal; the load distribution as it should be, that is, only the permissible loading on each deck; yet the boat became top-heavy because either the water ballast in the tanks was insufficient, or because the boat rested on the bottom of the river. It is possible, even probable, that the load was greater than it should have been; that the water ballast was lacking or at least insufficient; and that the boat's keel rested on the river bottom. It is possible that it was the combined effect of the above that caused the cessation of equilibrium, and cost nearly one thousand lives.

The principle of using a gyroscope is right. The suggestion is a very good one, and most opportune. Whether a gyroscope, in this instance, would have delayed the capsizing is problematical for two reasons. Firstly, no attempt was made to maintain the ship's stability, nor was any attention paid to signs of distress, apparently. Secondly, a gyroscope designed for the ordinary stabilizing would not have sufficient momentum to care for the conditions that are thought to have obtained prior to the overturning of the *Eastland*, on account of their radical departure from the normal.

The electrically driven gyroscope opens up a very promising field for boats designed as the *Eastland* is thought to have been designed; for stabilizing ships during periods such as existed before the *Eastland* turned over. The gyroscope has already amply demonstrated its superiority over the water pendulum or water tanks for maintaining stability. Already it has been suggested that the

gyroscope be used for rocking boats off sand bars, etc. The conditions to be met are not far different from those of the *Eastland*. The writer saw the gyroscope used by Lewis Brennan in England in about 1906 for his monorail cars; the application is very similar to a boat resting on the river bottom.

The gyroscope is in wide usage in the British and German navies for the steering of submarines and torpedoes, while the gyro compass is a necessity on battleships during the time of battle, because of the numerous magnetic influences that make the ordinary magnetic compass practically worthless. The gyroscope is now being installed on all American submarines, it is believed. For stabilizing ships and for reducing the effect of heavy, tossing seas the gyroscope is now in use.

Much work has been done on applying the gyroscope, but the results, and even the present-day applications, are not generally known. The gyroscope is no longer in the experimental stage, it is an actual commercial piece of apparatus. There are gyroscopes weighing thirty tons, capable of exerting a force couple of four million pound-feet and more now in use. For anyone desiring to learn what has been and is being done in marine work with the gyroscope the following will be found very lucid and useful. The arrangement is according to what will be most useful as applied to the *Eastland* disaster.

"Electrically Driven Gyroscopes in Marine Work." H. C. Ford. A. I. E. E. *Proceedings*, June, 1914.

"Stability of Ships—Notes for Commanders." George Nicol. *Inst. Marine Engineers*, January, 1913.

"Engineering Applications of the Gyroscope." E. A. Sperry. *Journal of the Franklin Institute*, May, 1913.

"Gyrostats and Gyrostatic Action." Prof. Andrew Grey. *Nature*, April 10, 1913. Address before the Royal Institute.—K. R., Chicago, Ill.

A floating ship is always subject to various external forces disturbing it from its position of equilibrium, and it is necessary to investigate the stability of such a position, *i. e.*, to determine whether the ship after receiving a small disturbance, will tend to return to its former position, in which case its equilibrium is stable, or whether, on the other hand, it will tend to move still farther from the original position, when the equilibrium is unstable. In the case under discussion only the effects on *transverse stability* need be taken into consideration.

Granting that the *Eastland* was stable (or even neutral), then doubtless either water ballast or the gyroscopic stabilizer would have been sufficient protection as long as the list was such that the righting moment remained within the limit of safety. In the case of a large list the resulting action is problematical (in this case, as we have seen, the result was fatal). The gyroscope method of balancing will very likely eventually win out over all other methods.

It is possible for a small quantity of water with an extensive free surface to render a ship unstable in the upright condition. The loss of stability at moderate listing angles is usually a maximum when the tanks are about half full. A further drawback to the water ballast is the comparative slowness of filling or emptying the tanks as per necessity. From the press reports it seems that the engineer on the *Eastland* attempted to fill the tanks counteractive to the list, but this could not be done quickly enough.

Until a few years ago the gyroscope was little known or heard of except as a child's toy, although as far back as 1852 its action was investigated by the French scientist Foucault, who published the results of his experiments in which he laid down very clearly the laws of its action. Among other things he demonstrated that when a gyroscope was given a forced motion of rotation about one of the axes, it would powerfully resist such force while at the same time tending to place its axis of spin in line with or parallel to the axis of the impressed force. For sake of brevity this law will not be discussed, but suffice it to say that its explanation is well known and directly follows the application of Newton's laws.

Several other investigations followed those of Foucault's and about 1903 Dr. Schlick, a German engineer, proposed the use of the gyroscope for stabilizing ships. To add strength to his proposal be devised an application of the foregoing principle and fitted it to the steamer *See-bar*. The flywheel of the gyro was one meter in external diameter, weighed 1,100 pounds, and was run at 1,600 revolutions per minute; its axis was initially vertical, and the casing containing the wheel was capable of revolving about a horizontal athwartship axis, the center of gravity of the apparatus lying slightly below this axis. A brake was fitted to control the longitudinal oscillations of the casing. When the wheel was revolving and the axis held by the brake, no effect was produced upon the motion of the ship; but when the axis was allowed to oscillate freely in the middle-line plane the period of roll was lengthened to 6 seconds, but no other extinctive effect upon the rolling was experienced. However, by suitably damping the longitudinal oscillations of the gyro (by means of a brake), a large extinctive effect upon the rolling was experienced, and during the trials made, the apparatus stopped practically all rolling.

The very high development of gyroscopic appliances (especially the gyroscopic compass) during the past few years has been due largely to the efforts of a pioneer in the electrical art, Elmer A. Sperry, who for some time now has devoted practically all of his time to this pursuit.

A type of gyroscope possessed of many tons of stored energy which may be harnessed and made to work not only to hold a mammoth ship against rolling in high seas, listing, etc., but actually to roll the ship for the purpose of sliding off a sand bar or breaking through an ice floe has been built in the last few years. Satisfactory tests and thorough investigations have been made and a gyro of thirty tons weight capable of exerting a force couple of over four million pound-feet is under construction for stabilizing the steamer *Ashtabula*, used as a car ferry on Lake Erie.

In two papers read before the Institute of Naval Architects and Marine Engineers, in November, 1912, and December, 1913, Mr. Sperry has treated very ably and comprehensively the subject of stabilizing ships, has made some striking comparisons, and demonstrated that the stabilization is practically complete. Practical data of great value were obtained from the construction of an active gyro plant which was repeatedly tested out on the United States ship *Worden* during the summer of 1912.

A symposium of results proves conclusively that the active type of gyroscope as applied to the control of a ship's rolling motion or listing tendency is of vastly greater efficiency and economy *than any other form of stabilizer yet proposed*. The economy is evident from a comparison of the space and weight required in an installation of the active gyro relative to that required by the most effective form of water damping tanks or other stabilizing means. The results further show that it is now possible to *stabilize completely* any ship against rolling by means of an active gyroscope, requiring a very small percentage of the weight and space available in the ship. An excellent paper on this subject is one presented before the A. I. E. E., in 1914, by H. C. Ford. This paper and the "discussion" thereon enters into details of mechanical features, calculations, etc.

It would seem from the above disclosures that the question can be answered directly in the affirmative. Had a gyro plant been installed on the *Eastland* in the first place, the fatal list would not have occurred in case the ship were *completely afloat*. If, as certain press reports indicated, the accident resulted from grounding of the keel, then the writer would conclude still that the gyro attachment would have counteracted listing tendency by virtue of the ability of such an installation to rock a boat off a sand bar without incurring the least danger of a capsizing.—P. B. W., Verbena, Ala.

THE FEDERAL TRADE COMMISSION INVESTIGATES THE FOREIGN MARKET FOR AMERICAN ELECTRICAL GOODS.

By Waldon Fawcett.

"Our home market has been so good that we have really heretofore given little attention to the exploitation of our foreign business. Now we are suffering for it." The speaker was Edwin M. Herr, of the Westinghouse Electric & Manufacturing Company, and his remark was addressed to the members of the new Federal Trade Commission—the "supreme court of business," lately organized as a result of legislation enacted by the Congress of the United States at its last session. The foreign market for American goods, and particularly for American-made electrical equipment and supplies, was the topic under discussion.

"We are suffering," continued the head of the Westinghouse Company, apropos the firm's foreign trade, "because we do not get the volume that we ought to get of foreign business to help us even up the fluctuations in our domestic business, which are inevitable." Yet, Mr. Herr explained in answer to questions, that about 10 per cent of Westinghouse business is foreign. "We do something above $3,000,000 a year in exports," he elaborated, "our total business running something between $30,000,000 and $40,000,000."

A number of representatives of electrical manufacturing interests and kindred lines have appeared during the past few weeks before the new Trade Commission. The consensus of opinion among these spokesmen for the industry is that expansion of our foreign trade in electrical staples and specialties is earnestly to be desired. For instance, the expressions on the part of Mr. Herr were emphatically endorsed by W. H. Heulings, vice-president of the J. G. Brill Company, of Philadelphia, builders of electric motor cars, one-third of whose business is foreign. Said Mr. Heulings, in discussing this subject: "Generally when domestic business is poor, foreign business is a little better. We always have a little something to look to in foregn trade."

It is significant that the Federal Trade Commission has given exceptionally liberal representation to the electrical interests in its hearings on foreign trade extension—not less significant indeed than that this important new federal body should have selected a study of the overseas trade situation as the first subject on its program. This attitude is the more interesting when it is borne in mind that most of the leading firms in the electrical industry are not keen for that legislative authority to maintain common sales agents abroad, which is besought by many business men, and to ascertain the actual need for, which is the primary purpose of the Trade Commission in its present probe.

Electrical men in general will probably find most interesting the disclosures made in the testimony of three leading officials of the Westinghouse Company, because the opinions advanced from this quarter are the result of a special and exhaustive investigation which has been in progress by Westinghouse executives for several months past. "During the past six months," explained Mr. Herr when addressing the Commission, "I have taken opportunity, as things are very much disturbed in South American territory, to send one of my assistants, Mr. Townley, on a tour of investigation throughout the entire continent of South America."

While he has left many details to his subordinates, Mr. Herr, as evidenced by his extended remarks, has reached very definite conclusions as to the needs of the export electrical trade. "I, personally, and my company," stated Mr. Herr, "are very greatly interested in the exploitation of our foreign trade. We do a considerable business in foreign markets, but ought to do a very much larger trade, and I believe, under proper conditions, we could do it.

"The thing that I feel is most pressing is the ability to get proper financial connections in the South American countries and better transportation opportunities. We are considerably handicapped in the matter of finance, but I am glad to say that is being remedied, from all the information we have been able to gather, to the effect of the recent exploitation in South American countries of our branch banks. This is destined to be very helpful to us. I might add that my company, in America, does very little export business to Europe; considerable to Africa, but very little to South America. We are represented in Europe by companies there—British, French and Italian companies."

Commissioner Hurley asked the question: "Do you compete with your English and French and Italian companies in South America?"

"No," was the reply, "we have heretofore handled the South American countries, and the British company has had representatives there. Yes, you might say it was competition, because they sold goods and we sold goods in the same territory. Of course, we were very close to their representatives."

The Federal Trade Commission—From Left to Right: George Rublee, William J. Harris, Joseph E. Davies (Chairman), Edward N. Hurley, William H. Parry.

Whether Westinghouse would have any desire to co-operate with other electrical manufacturing companies in exploiting foreign trade was the purport of the next question by Commissioner Hurley.

"We would have, of course, very great interest," responded Mr. Herr, "in co-operating with our foreign companies in every way possible and it might be possible, under proper conditions, that we could co-operate with other electrical manufacturers. I think that is a subject that is very important, owing to the fact that our foreign competitors have no restrictions in that respect whatever, and we are meeting very drastic conditions as to prices from German, French and British com-

petition in our lines of manufacture."

"The Germans are your chief competitors?" was the next question.

"The Germans were perhaps our most severe competitors in South America," admitted the Westinghouse executive, referring to conditions as they existed up to the outbreak of the war, "but we compete also with British and French manufacturers there also. We have suffered more from German competition than from any other foreign competition. I have felt that the Germans had a great deal more assistance in their arrangements, that they can possibly make under the law, than we have; and I think there is a field where the American manufacturers can be very greatly helped. That has got to be done with due regard for the possibility of these foreign competitors of ours establishing agents and subbranches in our country to enable them to get into any organization or arrangements that might be made for American manufacturers. It might work to our very severe detriment."

Members of the Federal Trade Commission Taking the Oath of Office.

Answering questions as to the policy of his company, Mr. Herr said: "Our very greatest interest in foreign trade, aside from the mere broadening of our field and extending the business, is the evening up of the load upon the factory. It is every difficult and very expensive to administer a manufacturing business under constant fluctuation of that business. During the times of depression our overhead expenses naturally go on in very large volume; and the costs necessarily go up.

"It is extremely advantageous to have a business as the foreign business in our line has been heretofore. When we are depressed here our foreign business tends to even up the load upon our manufacturing facilities. It tends to keep our employees more steadily employed, and enables us to produce our goods at better costs than we could possibly do if we had that kind of a load to even up and did not have our foreign trade to help us."

The manufacturer corrected an erroneous impression evidently held by some members of the Trade Commission, to the effect that the export electrical trade is largely in supplies, rather than in extensive installations. Mr. Herr explained that his firm not only does a supply business, but has furnished large equipments of all kinds in South American territory and in African territory. "In fact," he added, "our goods are sometimes specified. The American goods have a very excellent reputation—I do not mean ours especially, but I mean American-made goods in the electrical line—for the high quality of the product, and we are frequently specified as against foreign competition. But they cut the price on us so severely and are able to produce goods and enter combinations—entering the market in ways that are very much to our disadvantage—that we find it very difficult to negotiate these high-class products when produced in competition with them. The financing of large projects through German and British financiers has affected us very seriously, of course, but there are still other agencies."

The Westinghouse spokesman disclaimed any personal knowledge of the reported purchase by the Simens-Schucktwerke people of the plants of competitors in Italy and France. Nor could he, in answer to questions, give any first hand information as to how the electrical manufacturers of Germany conduct their business through cartels. "We get the information," he said, "that they are able to exploit by means of the assistance not only of combinations among themselves, but also by direct government assistance. They are favored in their export trade as against their domestic trade, due to freight discriminations, etc."

Asked whether Westinghouse would not prefer to go it alone in the foreign field, rather than to come into any joint selling agency, Mr. Herr said: "We probably would. We have not considered the likelihood of having joint selling agencies, but I can well understand that there are many lines of business where they would be highly advantageous." He reiterated the need of proper financial connections, adding: "We are extremely handicapped in almost every foreign country by the lack of financial information available."

He also referred to the need of an American merchant marine and in reply to a question as to whether his company had found it necessary to adopt any new methods in foreign trade since the war, said: "No, our methods are not particularly different from what we did before the war. We have had some few cases where customers were caught and could not get their goods, but not anything of any great amount. I think that was due largely to the depression in South American territory.

Calvert Townley, assistant to the president of the Westinghouse Company, was able to give to the Commission particularly up-to-date information, because he has lately returned from a trip during which he visited most of the countries of South America. He declared that Latin-American markets are closed to a considerable share of Yankee-made electrical goods. Two reasons were assigned for this state of affairs. One explanation is that a large share of public-utility enterprises are financed by European capital and consequently orders for equipment go to European firms. A second explanation lies in the "leaks" of information due to the circumstance that the banks through which American firms must do business are conducted by foreigners. Without vouching for the stories, Mr. Townley told of the reports generally current to the effect that German banks in South America copy American bills of exchange and invoices, with the result that the information thus gleaned as to American competition, prices, etc., is quickly placed in the hands of German firms.

Evidently, Mr. Townley thinks that in the electrical field at least, all would not be smooth sailing for common seling agencies abroad. The chief obstacle he foresees is the difficulty of ar-

ranging combinations between producers of high-grade and low-grade products. He fears that the high-grade manufacturers might refuse to go in. There could be no objection, he thinks, to such a pooling of sales machinery in certain lines and he cites as an example the incandescent lamp business, there being on the market many lamps of high grade but different in quality—a state of affairs which affords no objection to all the lines being handled by one representative. Mr. Townley summed up his opinion of the South American electrical market in the sentence: "Generally speaking, electrical equipment follows the investment."

Maurice Coster, export manager for the Westinghouse Company, has furnished the Trade Commission with a wealth of inside facts about the export trade in electrical goods to Russia, South America, etc. One of his most interesting disclosures was with respect to German competition in South America. Said he: "The Germans have been able to reduce their selling expenses by making agreements between themslves as to the territory to be exploited. For instance, a few years ago, we would hardly ever meet any German competition in the Argentine except that of the A. E. G. Company. On the other hand, in Chile we would have nothing but the Siemens-Schuckertwerke competition, whereas we would find all the leading American electrical companies competing with each other in Argentina and Chile.

"By reducing their selling expenses the Germans have been able to sell cheaper apparatus. I think if we should go to our principal competitor in this country and make such an agreement we might be called to task on the ground that we were moving against the provisions of the Sherman Act. We would like to make such an agreement because South America is an immense field. It can easily be divided up. In Brazil, for instance, there is a very decided pro-American feeling. We do not need to meet German competition in Brazil—not always. On the other hand, in the Argentine, where there is so much German and English and Italian capital, we absolutely have to meet competition." Through bills of lading constitute another boon sought by Mr. Coster. He would like to see an arrangement whereby a railroad shipping, say from Chicago to Rio de Janeiro, would be permitted to issue through bills of lading and make special combination freight rates with the steamship companies.

Walter C. Fish, of the General Electric Company, discussed especially, for the benefit of the Trade Commission, the labor equation in the electrical industry with reference to its effect upon foreign trade. Said he: "A great many people think there is no nation so industrially efficient as we are, but I am sorry to say that is not so. There are portions of Europe fully as efficient as we are and paying one-half the wages. This brings to my mind the question of not only obtaining foreign trade but of subsequently retaining it. I haven't the slightest doubt that we are going to get more of it. Especially will we get foreign business where the per cent of labor, so to speak, in the value of the product is comparatively small. Our start in increasing foreign business will be along such lines."

The General Electric official advocates selling combinations among firms operating in the foreign field for the purpose of cutting down general expenses and likewise to prevent business houses from "needlessly knifing each other." Furthermore he urges "playing up to the coming generation" by establishing trade schools and apprentice systems. He protests, however, that the industry cannot afford the restriction of output which is today manifest in many directions, supposedly due to the influence of labor leaders, etc. "Our costs in this country," concluded Mr. Fish, "must be as low as possible—and fair at the same time—if we are to have any show whatever where labor constitutes an appreciable part of the value of the product to be exported. I am familiar with the costs, in many European countries, of articles quite similar to those which I chance personally to manufacture and I tell you we cannot afford to go backward."

Several firms in the electrical field that have not, individually, any need for common selling agencies have declared for them to the Trade Commission on the theory that such sales facilities abroad would aid the smaller concerns in the industry. In connection with a declaration in favor of cooperation in export, Vice-president Heulings, of the J. G. Brill Company, gave this bit of advice: "If you have a business large enough to subdivide, take your foreign business in one hand and your domestic business in the other and keep them far apart and you will have plenty to do."

Combination with competitors to work out problems in connection with specifications—this is the need of the hour as the situation is sensed by Everett Morss, president of the Simplex Wire & Cable Company. Until within the past year his firm has done comparatively little export business. But since the outbreak of the war, and particularly during the past few months, inquiries for rubber-insulated wire and cable have been so numerous that the firm has taken space in a leading English electrical paper and is going to "make a drive" for foreign trade. The head of the Simplex Company says that his concern does not expect to make any money the first two or three years, but it is building for the future. Incidentally he has not lost sight of the fact that he can afford to market electrical goods abroad with no margin of profit if he is enabled thereby to raise factory production and hold down overhead charges on the entire output.

"If we are going to make a real drive for export," said President Morss, "it might be necessary for us to make a combination in some way with a number of our competitors in order to work out the question of specifications. Practice in Europe is quite different from what it is here. We have in many instances got to change the point of view of the foreigners before they will take our goods and combination is necessary to educational work—to overcome prejudice."

In proof of the superiority of the American processes to which foreign consumers need to be converted, the Simplex executive cited a personal experience with a leading English manufacturer who was bemoaning the fact that a certain theoretically advisable process could not be used in cable manufacture and who was rendered all but speechless when told that the impossible process had long been in successful use at the Simplex plant. In short, to get foreigners to take American electrical goods is, in many instances, Mr. Morss declares, not a question of competition of quality but merely "competition of state of mind."

Transmission Line in Connecticut Nearing Completion.

A 66,000-volt transmission line connecting the Falls Village hydroelectric station of the Connecticut Power Company with the Dutch Point steam station of the Hartford Electric Light Company is nearing completion, and will be put in operation in about a month. The length of the line is about 60 miles and there are 700 66-foot towers, spaced about 450 feet apart. The cost will be about $250,000.

When completed, the transmission line will be used as a reciprocal feeder between the two stations, the water power company furnishing energy to the lighting company during seasons of abundant water, and the opposite course will prevail when water is low and the summer load at Hartford permits of sale of surplus energy. The capacity of the Hartford Electric Light Company's steam station is 30,000 horsepower and of the Connecticut Power Company's station 9,000 kilowatts.

English Electricity Works Conference.

English municipal electrical officials had to vary the arrangements for their annual convention held recently owing to the war, and the reports of the several committees showed that their operations had been greatly interfered with owing to the state of war. Major H. Richardson, city electrical engineer of Dundee, the president for the year, was called out on military service and in his absence A. C. Cramb, borough electrical engineer, became acting president. The place of meeting in consequence was changed from Dundee to London and all social functions were abandoned, the usual four or five days' convention resolving itself into two days' meetings, held at the Institution of Electrical Engineers.

The Incorporated Municipal Electrical Association has 377 members, 174 of whom are chief engineers of electricity undertakings, and nearly as many non-technical municipal committeemen. The association approached the war office, pointing out the desirability of preventing electricity works staffs from enlisting without special permission, and to prevent the staffs at work from being below the minimum necessary for safe operation. The war office agreed that those who were of necessity engaged on such works were doing service of equal use to that of fighting men, but declined to grant badges or certificates of exemption.

The new Development Committee to whose proceedings reference was made in these pages a few months ago, reported upon the difficulties of carrying on its particular class of work in time of war. It was only able to meet once in three months, but its various subcommittees did a certain amount of business. For instance, the publicity sub-committee took preliminary measures toward a scheme of co-operative advertising, printing and publicity work, and has approached the publicity committee of the London electric supply companies with a view to combining the publicity efforts of all classes of electricity undertakings, avoiding wasteful overlapping and bringing about an organized campaign for the development of public electricity service. It is hoped that under more favorable conditions than obtain at present some means may be found for co-operating with the Society for Electrical Development, Inc., of the United States.

The Electrical Installations subcommittee is proceeding along the following lines:

(1). To examine, tabulate and describe the various methods of wiring in use, with advantages and disadvantages, with a view to bringing about any possible reductions in the cost of installation work compatible with safety.

(2). To obtain the assistance and opinions of practical men in touch with this class of work, and to promote discussion on the subject.

(3). To promote practical criticisms of accessories in common use, in connection with installation work, with a view to collating information which would be valuable to manufacturers and users.

(4). To take an early opportunity of considering alternatives to the present design of plug contacts for heating, cooking and other purposes, particularly in regard to the possibilities of superseding the ordinary pin or concentric patterns by some more satisfactory form of plug contact.

The domestic appliances sub-committee has made plans for conducting various investigations regarding hot and boiling plates and other apparatus primarily for domestic use, but also usable for business and other purposes. It will deal with the whole of the apparatus from its connection with the permanent wiring of the installation; that is, where the work of the electrical installations sub-committee leaves off.

The report of the electric vehicle committee chiefly consisted of a summary of the periodical reports of its proceedings to which we have given publicity during the past year. The following reference was made to the affiliation with the Electric Vehicle Association of America: "The committee desire to again refer to the most useful results that have followed upon the continued affiliation with this important association through the membership of their honorary secretary. The association, both through its most energetic executive secretary, A. Jackson Marshall, and the chairmen of its various committees, has shown itself most anxious to help this committee whenever such help has been asked. The committee desire to place upon record their appreciation of the value of this co-operation, and their thanks for much useful information received."

A discussion took place on a joint report by two prominent chief engineers (A. S. Blackman of Sunderland, and T. Roles of Bradford) on "The Practical Result of the Point Five Tariff." In regard to results at Bradford it was stated that although domestic consumers had not been approached individually for the purpose of explaining the advantages they would enjoy by changing over from the flat rate to the "point five" tariff, more than half of such consumers had elected to be charged on the latter system, and had introduced electric heating or cooking apparatus. "This is all the more remarkable when it is borne in mind that no general attempt has been made to induce consumers to install heating and cooking apparatus, the staff of the business-development department having been fully occupied in dealing with power supplies." The Bradford Electrical Contractors' Association, through its secretary, expressed the contractors' view of the "point five" tariff as follows:

"The domestic tariff is one that is popular among your consumers in that it is quite simple and easily understood; in this it differs materially from the maximum demand system which I find to be quite beyond the grasp of the average lay mind, and . . . looked upon with some degree of suspicion. By enabling one set of wires to be used for both heating and lighting, the domestic tariff simplifies the wiring of a house, and, therefore, reduces the initial cost of the installation and by so doing tends to popularize the use of electricity . . . the extensions of the wiring are easier and not so costly as when the house is wired in duplicate for both heating and lighting. . . . Where the domestic tariff is in operation it is much easier to persuade the user to extend both his lighting and heating installation than is the case when the user takes his energy at the old flat rate; the argument that the additional load will only add so much electricity at one cent per unit to his bill usually proves irresistible. The large increase in the number of radiators installed in Bradford during the past few years is undoubtedly a direct result of the domestic tariff, and I believe that it is only under this system of charging that electric cooking will make appreciable headway. Looking at the domestic tariff from a contractor's point of view, I am satisfied that it is a system of charging which makes for increased business, and as it appears to give satisfaction to the user, it has my emphatic approval, coupled with the hope that the principle may, at an early date, be extended to those of your consumers who are occupiers of shop, warehouse, and other business premises, and who are at the moment excluded from the scope of this tariff."

Hammond System of Torpedo Control.

John Hays Hammond, Jr., of Gloucester, Mass., in a recent lecture in that city, stated that naval officials of the United States Government will recommend to Congress the purchase of his system of wireless control of torpedoes and will advocate the establishing of stations on the seaboard for operation of the apparatus, with a view to harbor protection. Mr. Hammond announced that he will transfer his experimental work to Fisher's Island, Long Island Sound.

THE FIRST INDICATION OF WHAT THE COURTS WILL CONSIDER UNFAIR COMPETITION UNDER RECENT LAWS.[1]

By Elton J. Buckley.

It seems to me as if the entire trade of the United States were waiting for some court decision which will declare what is to be considered unfair competition under the two most recent anti-trust acts—the Federal Trade Commission Act and the Clayton Anti-Trust Act. The Federal Trade Commission Act, it will be remembered, prohibits "unfair competition," but does not pretend to say what unfair competition shall be. The Clayton Act does name a few acts which are to be deemed monopolistic or unfair, but these for the most part are only generalizations, and the details will have to be worked out by the courts.

This gives special interest to a case which has just been decided in Indianapolis, Ind., involving most of the questions of monopoly and restraint of trade. The Government sued a large manufacturer of a certain store appliance, whose products are sold all over the United States. The charge was the use of oppressive methods destined to destroy competitors and restrain competition. The manufacturer decided not to defend the suit and allowed the court to enter a decree against him. I have just been sent a copy of this decree, which sets forth particularly what shall be considered unfair competition in this manufacturer's case. His case, however, will not be very different from many other cases.

The decree is handed down under both the Clayton and the Federal Trade Commission Acts, and is about the first detailed indication of the way the courts will look on various acts of competition. This particular court was the United States Court for the Indiana district.

As I regard the decree as of great importance, I reproduce from it the acts which the court said could no longer be legally done:

From employing spies to get information regarding competitors' business by taking employment in the latters' factories, shops or offices.

From price-cutting below cost of production and from discrimination in prices for the purpose of harming a competitor.

From bribing, hiring or employing architects, fire marshals, insurance representatives or municipal officers or employes to use their influence in promoting the sale of its own products or in preventing the sale of competitors' products.

From getting or trying to get cancellation of orders taken or of sales made by competitors or interfering in any way with contracts of competitors. The defendant company had, according to the complaint, what it called its "knockout squad," a force of special salesmen whose duty it was to cause cancellation of competitors' contracts.

From making false representations to customers, real or prospective of competitors, concerning the standing or business methods of the competitors, with the intent to injure them in their business.

From bringing or threatening suit against competitors and their customers, real or prospective, on the assertion, known to be false or not believed in good faith to be well founded, that the products of competitors are an infringement of the patent rights of the defendant company.

From agreeing to indemnify customers, real or prospective, of competitors against loss if they cancel contracts with competitors.

From inducing or hiring draymen, railroad employees or other persons to obtain from shipments made by competitors or from other sources, the names and addresses of their customers; except that salesmen in reporting prospective customers on whom they have called, or employees engaged to make canvasses for the purpose of ascertaining the names and addresses of prospective customers, may report the name of the appliance owned by the prospect if the purpose is not to injure the competitor.

From inducing or hiring salesmen, agents or other employees of competitors to leave their employment to enter that of the defendant company. However, such change may be made if without inducement from the defendant company.

Readers will note that several acts are forbidden here with very many concerns are regularly doing today in the course of every-day business. I do not believe, however, that these acts would necessarily be illegal if done by any concern. The defendant manufacturer in this case is the largest producer in his line. He has no monopoly, but he might be said to have control. Therefore the standard which would be set for his acts would be much more rigid than the standard set for the smaller man who made a small fraction of the total output. For instance, a manufacturer making one per cent of the total output in his line could do many things, and do them legally, that the dominant figure in the industry could not do at all. He could hire competitor's salesmen, for instance, without being guilty of unfair competition, although he might be liable to a civil suit by the employer whose salesmen he coaxed away. He could also, in my judgment, persuade customers to cancel orders given to competitors, though again there would be the chance of a civil suit for damages by the concern losing the order. It is one of the penalties of greatness—that the legal restrictions about one are much tighter than those about one's smaller competitors.

1 Copyright, 1915, by Elton J. Buckley.

Platinum Production Larger.

The placer miners of California and Oregon saved 570 ounces (troy) of crude platinum in 1914, as compared with 483 ounces in 1913, according to statistics collected for the U. S. Geological Survey by J. M. Hill. The greatest increase in production was in Oregon, which showed a gain of 85 ounces.

From this crude platinum 525 ounces of metallic platinum were extracted, valued at $23,625 figured at the average market price, $45 an ounce. The Boss gold-copper-platinum mine, near Goodsprings, Clark County, Nev., produced 110 ounces of platinum.

Besides the platinum obtained from sands and platinum ore 2,906 ounces of this metal were obtained from new material, of both domestic and foreign origin, by smelters and refiners of gold and copper bullion and mattes.

The secondary platinum industry handled 40,826 ounces of platinum, which was obtained from refining scrap metals and sweepings of the jewelry and dental trades.

Even if the imports of foreign platinum were greatly reduced, there are apparently sufficient stocks of this metal in the United States to meet domestic requirements, for the price of platinum, which rose to $50 an ounce just after the war was declared, had by July, 1915, fallen to $37 an ounce, or $8 an ounce less than the average in 1914. Another explanation of this low price may be the increasing use of tungsten, molybdenum, and nickel-chrome alloys in the electrical industry, and the use of plated ware in jewelry and dental work.

The following table shows the production of platinum in 1913 and 1914:

WORLD'S PRODUCTION OF PLATINUM IN 1913 AND 1914, IN OUNCES.

Country.	1913	1914
Russia, crude	[a]250,000	[a]241,200
Canada, crude	50	30
New South Wales and Tasmania, crude[b]	1,275	[a]1,248
Colombia, crude	15,000	[a]17,500
United States domestic, crude	483	570
United States refined platinum from foreign and domestic matte and bullion	1,100	2,905
Borneo, Sumatra, and others	200	(c)

[a] Estimated.
[b] Chiefly iridosmine.
[c] No basis for estimates.

OPERATION OF MAZDA "C" STREET LAMPS.

By Carroll H. Shaw.

The following data are the results of tests conducted on a street-lighting system composed of four individual circuits, each equipped with approximately sixty 20-ampere, 600-candlepower compensator-type street series Mazda "C" lamps, operated at 7.5 amperes.

Fig. 1 shows, first, the variation in watts consumed by the lamp and compensator combined; second, the variation in the voltage across the terminals of the complete fixture; and third, the power-factor of the unit under varying values of primary line current. It is found that for each variation of 0.1 ampere in the series circuit, there is a change in the energy consumed in each of the units of from 10 to 11 watts. This is equivalent to a 2.5-per-cent increase in energy consumed by the unit with an increase of one per cent in line current.

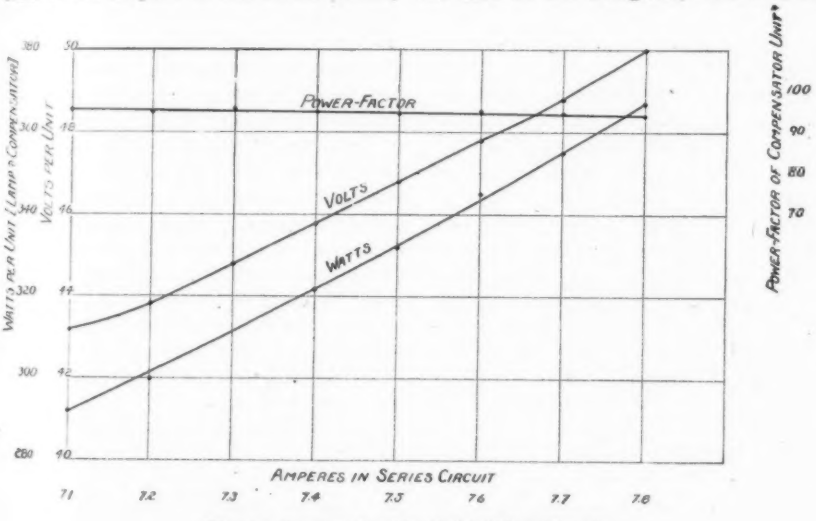


Fig. 1.—Curves for Street-Lighting Circuit.

The increase in current results in an increase of light from the lamps, a decrease in the life of the lamp, an increase in the wattage consumption, and a slight decrease in the effective power-factor of the unit. It has been found also that the frequency of the alternating-current service considerably affects the energy required, and although no satisfactory tests can be shown for a commercial circuit, due to the impossibility of varying the speed of equipment more than five per cent, it has been found that the change in energy consumed is almost directly proportioned to the frequency obtained.

In comparing the power taken by each unit and the total power delivered to the regulator, it is found that there is a loss of 73 watts per lamp, or, in other words, 18 per cent of the power taken is required to operate the equipment and to make up the line loss.

It is interesting to note that the wattage of the unit complete is 332 at rated current. These lamps were rated at 600 candlepower, 300 watts, when originally placed on the market and the compensator was rated at from 25 to 30 watts.

Memphis Jovians Active.

Memphis Jovians will have charge of the big automobile parade, which will be a feature of the convention of the Cotton States Merchants' Association, which is to be held in Memphis, Tenn., on August 17, 18 and 19. It is expected that there will be at least 1,000 automobiles and motor trucks in line, including the cars of the delegates, who are, as far as is possible, coming to the convention by motor. W. R. Herstein is chairman of the Jovians Parade Committee.

Boston Electrical Men Hold Outing.

An outing of electrical contractors and workmen of Greater Boston was held at Baker's Island, Salem Harbor, August 7, with about 200 in attendance. The day was spent in get-together festivities, which included field sports and a clambake, with corn, lobster and other delicacies.

The following were the committee in charge: R. H. Hallawell, R. S. Hale, H. A. Holder, L. C. Billings, F. L. Barnes, A. J. Hixon, H. S. Potter. The steamer *Griswoid* carried the party to and from the island.

Massachusetts Institute of Technology to Receive Big Fund.

The Attorney-General of Massachusetts has approved of the transfer of a fund of $5,500,000, left to Howard University by the late Gordon McKay, to the Massachusetts Institute of Technology. The will of Mr. McKay specified that Harvard should establish a school of mechanics, electricity, physics, engineering, manufacturing and commerce. The trustees of the University felt that the Institute of Technology could better carry out the work intended by the donor. The trustees of the will have asked the supreme court to permit the transfer.

Tesla Sues Marconi on Wireless Patent.

A suit has been brought by Nikola Tesla against the Marconi Wireless Telegraph Company of America, seeking the annulment of one of the chief Marconi patents. Simultaneously with the suit for the annulment Mr. Tesla has brought a suit against the Marconi Company for infringement of his patents.

This litigation is a new development in the Marconi Company's claim to ownership of all basic patent rights in the transmission of wireless messages.

The dispute over patent rights between the Marconi Company and Mr. Tesla began in August, 1914, when the Marconi Company sued Fritz Lowenstein, a German engineer, alleging that certain wireless apparatus sold by him to the United States Navy was made in violation of Marconi patent 763,772. It was announced then that Mr. Tesla would testify for Mr. Lowenstein, alleging that the Lowenstein devices were developed from Tesla patents 645,576 and 649,621, which were granted prior to the Marconi patent.

In the present suit Mr. Tesla bases his action on the allegation that his two patents were granted in 1900, and that the Marconi patent was not granted until 1904. The bill of complaint asks for a decree adjudging the Marconi patent null and void, and asserts that the Marconi patent covers the inventions and combinations of apparatus described and claimed in the Tesla patents.

The answer of the Marconi Company denies that the Marconi patent covers the inventions or combination of apparatus described by the Tesla patents, and also denies that it is guilty of any infringement. The company claims that its patent was granted to Guglielmo Marconi on the proof of independent invention by Marconi, not due to or based on any invention of Tesla.

A hearing took place before Judge A. N. Hand, in the federal district court in New York City on August 5.

The Geological Survey now has available for distribution its annual statement on silver, copper, lead and zinc in the central states in 1914.

BOOK REVIEWS.

"Telegraph Engineering." By Erich Hausmann. New York: D. Van Nostrand Company. Cloth, 406 pages (5½x8¼ inches), illustrated. Supplied by the Electrical Review Publishing Company, Inc., for $3.00.

"This book is intended for electrical engineering students, and as a reference book for practicing telegraph and telephone engineers, and for others engaged in the arts of electrical communication."

The following chapters indicate the scope of the book: Chapter I, "Simplex Telegraphy"; Chapter II, "Duplex Telegraphy"; Chapter III, "Quadruplex Telegraphy"; Chapter IV, "Automatic and Printing Telegraphy"; Chapter V, "Telegraph Office Equipment and Telegraphic Equipment"; Chapter VI, "Miscellaneous Telegraphs"; Chapter VII, "Municipal Telegraphs"; Chapter VIII, "Railway Signal Systems"; Chapter IX, "Telegraph Lines and Cables"; Chapter X, "Theory of Current Propagation in Line Conductors"; Chapter XI, "Submarine Telegraphy." Appendix giving: I, Trigonometric Functions; II, Exponential Functions; III, Logarithms; IV, Hyperbolic Functions.

It is seen that a wide field is covered in this book of 395 pages. It is obviously necessary to select with extreme care the topics and details that are to be discussed in order to successfully supply the needs of the public, for whom the book is intended. It would seem that the requirements of the undergraduate student were fully met. The topics chosen cover quite completely all phases of telegraph engineering which it is desirable for them to consider. The diagrams are well drawn, and the descriptions, while concise, are clearly expressed. The equations needed for the calculations of the various engineering details are given, and always accompanied by illustrative examples. Cost calculations in a number of cases are made, and the importance of exact design is emphasized. The theory of "Current Propagation in Line Conductors" is well developed, and if thoroughly mastered by the student would be of permanent value to him in his future engineering work.

For more advanced students, or for well trained engineers the book, if used for reference, has certain limitations. Alternative methods are seldom given. Methods of testing are not considered, and the disturbances caused by the failure of circuits or apparatus to conform to the normal have not been treated. The use of unusual symbols or of customary symbols having unusual meaning reduces the value of the book for reference, particularly as it is necessary to sometimes search for the definition of the symbols that have been used. References to more detailed discussions of the subjects treated are seldom given. In a book of this character it is, of course, unnecessary to give the sources from which much of the work is obtained, but the failure to do so sometimes limits the usefulness of the treatment without materially affecting its bulk. The proof reading has been exceedingly well done, but a careful engineer will not be satisfied with a single reference for important constants or equations upon which to base his calculations.

The exposition of the many subjects discussed is almost without critical comment, the presence of which would add much to the value of the book.

The competent instructor can supply the alternative methods, the references, the critical analysis and the results to be expected from a probable departure from simple normal conditions, which will supplement this volume, and so make it in its brief, logical, well balanced presentation of telegraph engineering an excellent book for the engineering student. CARL KINSLEY.

"Alternating-Current Electricity and Its Applications to Industry." By W. H. Timbie and H. H. Higbie. New York: John Wiley & Sons, Incorporated. Cloth 534 pages (5x7½ inches), 370 illustrations. Supplied by Electrical Review Publishing Company, Inc., for $2.00.

The increasing importance of alternating currents in the industrial field makes it necessary to have a wider knowledge of the theory of alternating currents; that is, it is not enough for only graduates of engineering schools to be versed in the elements of alternating-current theories and practice, but the man that handles the apparatus should also be familiar with the characteristics and principles of working of the apparatus and machinery under his care. This necessity has resulted in the production of several elementary texts on alternating currents and the book before me belongs to this class. It can be read by anyone who has a rudimental knowledge of trigonometry. The treatment is quite elementary and yet it is thorough and will serve admirably as a foundation for more advanced study.

In order to hold the interest of non-technical men, as well as to give the reader some idea of the industrial importance of alternating currents, the subject is introduced by a chapter on "Modern Systems of Power Transmission." As this introduction is intended merely to give the student the proper background, the technical accuracy of the discussion should not be too closely scrutinized. Nevertheless, it seems unfortunate that greater care was not exercised to avoid confusion, if not inacccurate statements. Throughout the chapter the terms "power" and "energy" are used interchangeably. For example, on page 4 the author states "steam engines, gas engines and water wheels when used to convert power into mechanical energy, etc., are for convenience sometimes called prime movers." This seems to the writer to be a new use of prime movers. A similar looseness of expression is found in Article I on the first page, where it is stated that "electricity is nearly always generated in one way or another from some kind of mechanical power." One of the essential, but nevertheless difficult accomplishments in textbook writing is consistency and accuracy in the use of technical terms. In view of the many good features of the book, the slight discrepancies mentioned above should not be taken too seriously.

The real study of alternating currents begins in Chapter II, where the author takes up the discussion of fundamental ideas. Chapter III treats the theory of parallel circuits; Chapter IV is devoted to power and power factors; Chapter V to inductive reactance; Chapters VI and VII to alternating-current generator; Chapter VIII to wave forms, and Chapter IX to armature windings of alternating-current machines. The outstanding feature of the text is the simplicity of the treatment. The authors use many mechanical analogies and their pump analogy which, in modified forms, illustrates not only the fundamental theory of alternating current, but makes clear the action and reaction in series circuits, parallel circuits, and phase relation, deserves very high praise. As a whole, the illustrations serve the purpose for which they are intended very well, but the attempt to give concrete ideas to the student seems to be overdone. For example, Fig. 154, is an outline of a generator on which has been drawn the conventional delta connection. It is very doubtful if any student will get the slightest notion of the actual connections from such a diagram. Why give to a beginner a notion which will lead him astray? Chapter IX on armature winding is deserving of special mention. Here, as in other parts of the text, we find the authors have given close attention to all minor details.

A most excellent collection of problems serves to make the book very useful to the teacher who may not have the time nor the facilities to make individual collections. Taken as a whole, the book may be safely recommended as an elementary text on alternating currents. C. M. JANSKY.

New Electrical and Mechanical Appliances

Street-Lighting Fixtures for Type C Mazda Lamps.

Specially designed fixtures are required for the Mazda type C lamps of high candlepower, in order to successfully utilize these lamps for the severe conditions of street-lighting service. The life of the lamp and the efficiency of the complete unit are vitally affected by the globe shape, ventilation and weatherproof qualities of the fixture. Inasmuch as the lamp-renewal cost per year for each fixture greatly exceeds the first cost of the complete fixture, it is self evident that any construction increasing the life of lamp without decreasing the efficiency of the complete unit is of prime importance, and that no make-shift device should from an economical standpoint be considered for installation with these comparatively expensive lamps.

Of first importance in the design of any fixture for this service is ventilation, as the heat radiated from lamps of the gas-filled type is comparatively intense and without ample ventilation the life of

Fig. 1.—Fixture Complete Without Reflector.

the lamps is very seriously curtailed. By careful experiment over a considerable period of time, the Westinghouse Electric & Manufacturing Company has determined the proper arrangement to give the maximum ventilation, and at the same time provide a weatherproof unit and also enable the proper screening of all openings to exclude insects. The latter feature is an important requirement with street-lighting fixtures but one that has been infrequently fulfilled. The high operating temperature of the Mazda type C lamp necessitates its careful protection from rain and snow. Consequently, the ventilation must be so arranged that the lamp is not in danger from this standpoint.

The appearance of a street-lighting unit is always of importance, inasmuch as it occupies perhaps the most conspicuous position of any piece of electrical apparatus. The unit shown in the accompanying illustrations is of symmetrical appearance, both when equipped with reflector and when used without the reflector. A 20-inch reflector of the concentric type gives the fixture the most finished appearance. The globe is of acorn shape to utilize the light to the best advantage. A diffusing globe is recommended on account of the high intrinsic brilliancy of the lamp, and because good street lighting requires minimum glare.

Fig. 2.—Fixture Complete, Showing Globe Lowered for Removing Lamps.

These fixtures are specially constructed with a view to maximum durability and accessibility. The case is of solid copper, finished in black enamel. The wires are brought to binding posts of neat, convenient and durable construction, as worked out in the best design of arc lamps. The globe is hinged at one side, and latched at the other, by means of a corrugated band of copper. This readily enables the replacement of lamps with but one hand. A specially designed skeleton socket has been adopted as standard for this fixture.

This fixture is primarily designed for use with the very efficient high-current lamp, and is equipped with an autotransformer to enable installation on existing 6.6 and 7.5-ampere, constant-current, alternating-current circuits. The 15 and 20-ampere lamps have a very much higher efficiency than the 6.6 and 7.5-ampere lamps. Even considering the losses in the autotransformer, the energy saving at one per cent per kilowatt-hour on a 4,000-hour-per-year schedule is sufficient to cause a saving equivalent to the additional first cost of the autotransformer within 18 months. At the same time, the use of the autotransformer eliminates the necessity for a film-cutout socket, inasmuch as the open-circuit voltage of the secondary amounts to only two or three times the lamp voltage, and this transformer is not injured by continuous operation on an open circuit.

The Westinghouse company has adopted as standard a core-type autotransformer for this purpose after careful consideration of the merits of all types. The efficiency of the core-type transformer is inherently higher than that of other types

Fig. 3.—Luxsolite Fixture With Globe and Case Removed.

because of its compactness and shortness of the iron circuit. Also, because of this construction, the power-factor is materially better, which has the effect of enabling the constant-current regulator, on which these fixtures should always be operated, to carry considerably more load than if the autotransformer had a power-factor even one or two per cent lower. The insulation of this autotransformer is

very important, because of the temperature under which it must operate. The winding is insulated from the coils by means of Micarta washers and the complete unit thoroughly impregnated with Bakelite, being therefore unaffected at any ordinary operating temperature.

Use of Telephone in Restaurants Takes the Din Out of Dinner.

The old-fashioned waiter with the stentorian voice and unlimited lung cacapity, who has been looked upon as an essential element in restaurants, is doomed to retire with the horse car, the kerosene lamp, and other antiquities. Use of the telephone is bringing about quiet and repose from nervous tension so conducive to enjoyment of a good meal in restaurant, hotel dining room, or lunch room.

Knight's Restaurant in Philadelphia, Pa., is noted for its "ready to eat" dishes. A large blackboard with the menu lettered upon it is fastened on the wall in plain sight of the patrons. The selection is made and the waiter notified. He does not proclaim to an audience that one has ordered "Ham and," nor does he call it down a speaking tube and repeat it five times until the chef on the other end understands. He simply takes a hand telephone from a convenient hook and quietly gives the order to the chef below. There are no delays, nor mistakes. The cook gets the order correctly at once and within a short time one gets the dinner ordered. The system consists of a hand telephone used by the waiter and a chest transmitter and watch-case receiver used by the chef. It was supplied and installed by the Western Electric Company. It is said that this outfit takes the din out of dinner.

Appleton Conduit and Pipe Supports.

Since conduits are coming more and more into use for wiring work many cases are being met with where the ordinary hangers and clamps for supporting the pipe are either entirely unsuited or inconvenient to install. This has prompted the Appleton Electric Company, 212 North Jefferson Street, Chicago, Ill., to place on the market two new conduit and pipe supports, which are illustrated herewith.

The new conduit hanger, which is shown in use in Fig. 1, is made in two parts. Of these the supporting base, Fig. 2, is provided with jaws that can be readily drawn together by means of the clamping screw. The clip, Fig. 3, is first snapped over the conduit and then slipped between the jaws of the supporting base. When the screw is tightened a firm grip is obtained on the conduit. These hangers are made of spring steel and are either black enameled or sherardized. They are easily and quickly installed.

Fig. 4 illustrates the new Appleton pipe clamp, which is of unique design.

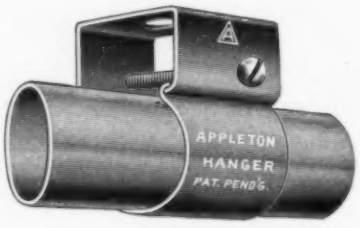


Fig. 1.—Appleton Hanger in Use.

This clamp is constructed of steel and is therefore not only light in weight but is practically indestructible. It makes an inconspicuous fastening, especially where the conduit is installed on tile, brick and concrete walls. It requires but a

Fig. 2.—Supporting Base for Hanger.

Fig. 3.—Clip for Conduit.

single screw or bolt to secure it in place and obviates the drilling of two holes. Its use saves the cost of one expansion bolt or screw and is an economical advance in conduit installation. This clamp is made for one-half, three-quarter and 1-inch conduit.

Fig. 4.—Appleton Pipe Clamp.

Small Battery-Charging Outfits for Automobile Ignition and Lighting Batteries.

A new line of battery-charging outfits has been designed especially for service in garages for charging automobile ignition and lighting batteries. These outfits consist of small motor-generator sets on which are mounted small switchboard panels bearing all the switches, instruments, etc., necessary for their control. They are to be connected to the incandescent lighting circuits by means of lamp cord and plug, the motor-generators being supplied for service on 110 or 220-volt, 60-cycle, alternating-current circuits, or on 110 or 220-volt, direct-current circuits. The motor-generators are supplied to deliver direct current at 12, 18 or 24 volts, such voltages being specifically adapted for charging ignition and lighting batteries.

The switchboards have a snap switch in the line circuit, for the purpose of starting and stopping the sets; a snap switch in the circuit from the generator to the batteries to be charged, for opening the charging circuit; a voltmeter for reading the voltage delivered by the generator; an ammeter for reading the charging current; a field rheostat for raising or lowering the voltage of the generator end of the set and, therefore, serving to adjust the battery charging current. A small push-button switch, placed in the center of the board between the two snap switches before mentioned, is provided so that the voltmeter is not in circuit except when it is desired to read the voltage delivered by the set. The rheostat provided on the switchboard in all cases has sufficient capacity to reduce the voltage of the set to that proper for charging a battery of any lower voltage down to and including a six-volt battery.

Battery-Charging Outfit.

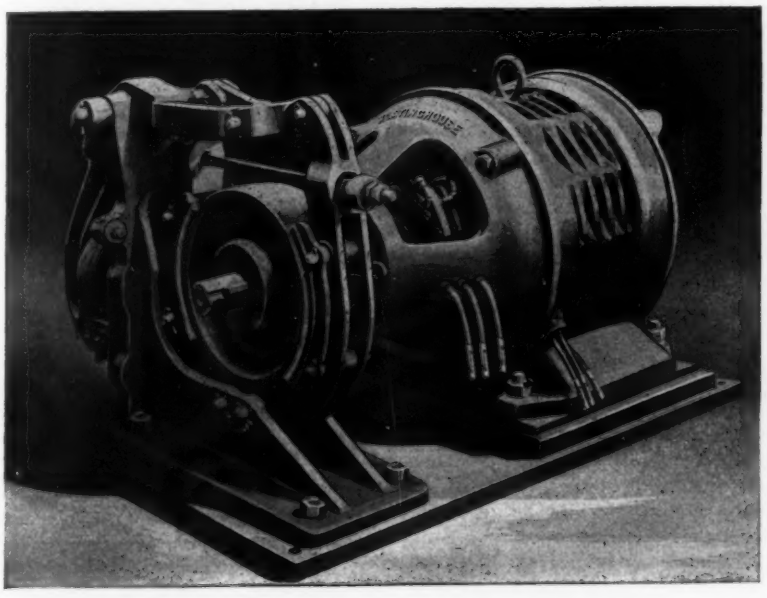
These charging outfits are so small that they may be placed at any convenient point in the garage, and when placed upon a work bench they will take up but very little room. They need practically no attention in service other than an occasional filling of the

bearing grease cups with oil. The switchboard, bearing all of the instruments, rheostats, switches, etc., properly wired leaves as the whole work of installation simply the necessity of connecting to the lighting circuit and to the battery by lamp cord. The outfits are supplied in two capacities, 175 and 250 watts output, such capacities having been found specifically adapted to the service of charging automobile ignition and lighting batteries.

The outfits are manufactured by the Fort Wayne Electric Works of General Electric Company, Fort Wayne, Ind.

New Alternating-Current Magnetic Brake.

The new alternating-current magnetic brake illustrated herewith has been designed especially for use with induction motors operating cranes, hoists, roller lift bridges, and many different classes of mill machinery, and it is applicable wherever frequent stops and reversals are necessary. The operating magnet is single-phase and may, therefore, be used on polyphase circuits.



Alternating-Current Magnetic Brake.

The action of the brake is simple. When the controller is thrown to the off position, two brake shoes are forced by means of springs against a cast-iron brake wheel which is keyed to the motor shaft. When the motor is started, the magnet coil is energized and the action of the magnet, operating through a lever and a toggle, forces the shoes apart and releases the brake.

In the design of this brake, the Westinghouse Electric & Manufacturing Company has embodied several improvements. It is a complete self-contained unit that can be mounted directly beside the motor or on a special sole plate, as shown. Since the application of its braking action is not dependent upon gravity, it can be mounted in any position, from the horizontal to 90 degrees in such a direction that the movable magnet lever has no tendency to fall away from the stationary magnet core. This makes it especially desirable for applications where the position of the motor changes during the operation, as on a roller lift bridge. The overall height has been reduced to a minimum so that it can be used in places where headroom is limited, as, for instance, in crane service. The insulation is such that the brake is adaptable for use outdoors and exposure to the weather without any modification whatever. No dashpots are used, thus all possibility of trouble due to sticking is eliminated. The brake shoes are made of cast iron to which are fastened woven asbestos-fabric linings. The wheel is made of cast iron, and the coefficient of friction between the brake wheel and shoes is not materially affected by oil, grease or water.

The pressure on the brake shoes can be varied by means of nuts on the spring rods and wear on the shoes can be taken up by means of an adjusting screw. Two springs are used and only two adjustment points are necessary. If the operator fails to take care of the adjustment which compensates for wear on the shoes, the result will not be a failure of the brake to set, it will only mean that the machine cannot be started, as the brake will not release.

With a view to facilitating repairs, axle-steel pins held in place by cotter pins have been used wherever this is possible.

This brake, known as type A, is made in sizes ranging from 5 to 100 horsepower for 25 and 60-cycle, 224, 440 and 550-volt circuits.

New Johns-Manville Lighting Showrooms in New York.

When the H. W. Johns-Manville Company took over the sales arrangements for the famous Mitchell Vance lighting fixtures and combined with them those for the Gill Company's Parian glassware it was predicted that something interesting would happen shortly. One of these developments is the new lighting display building in New York.

Next door to the Johns-Manville Building at Madison Avenue and Forty-first Street, New York City, stands an old brown-stone mansion, one of the survivals of that not yet distant period when the Manhattan merchant princes thought Murray Hill the center of residential New York. This building has been acquired by the Johns-Manville Company with the unique idea of showing in appropriate surroundings all the various lighting fixtures for the modern home or office.

The old rooms have been restored and handsomely furnished and each one filled with lighting fittings appropriate to its character. Drawing, dining and bedrooms, hall, stairs and office, all have their proper setting and arranged so that the architect or his client can come and study quietly the exact effect of each type of lighting and each kind of fixture.

Hitherto the trouble in displaying lighting equipment has been that it was impossible to get a correct idea of the complete fixture in advance. The metal parts usually came from one house, the glassware from another, and, if any special design or scheme were called for, it was only obtainable after considerable trouble.

Under the new arrangement the various departments of lighting design will be co-ordinated and, in co-operation with the architect, it will now be possible to arrange a lighting system which will form an architectural unit with the building as a whole.

Among the special displays in the new lighting showrooms are those showing the efficiency and economy of the J-M Linolite system; this system is making rapid strides in favor for the lighting both of public and private buildings. The Frink system of concealed lighting for banks, offices, etc., and the Frink Polaralite signs are also shown as wonderful examples of applied design. The beauty of Mitchell Vance brass and bronze work and the unique translucency of Gill Parian glassware form an exceptionally pleasing combination made available by the enterprise of the H. W. Johns-Manville Company. All of these are exhibited in endless variety and serve to make a visit to the new showrooms amply repaid, the displays on the first and second floors being particularly complete.

Telephones Aid Grain Loading.

The Girard Point grain elevator at Girard Point (near Philadelphia) is said to be the largest of its kind in the world and is the only one to have its operations controlled by a system of telephones.

There are four traveling belts that cover the entire great length of the bridge, enabling the operators to load ships from both sides of the bridge at the same time. The man who controls the movement of the belts is stationed at the base of the bridge. He is supplied with telephones which put him in instant communication with any part of the system. The belt attendant on the bridge and the watchman who stays on the pier near the boats that are loading are provided with hand telephones, attached to which are cords and plugs. Desk-set boxes equipped with jacks and special loud gongs are placed at regular intervals on the bridge and pier. The man who controls the belts can summon either of these men to the station where he wants them by pressing the button corresponding to that station which rings the gongs at that desk telephone. The man summoned inserts his plug in the jack at that telephone and receives his instructions. If he wishes to call the man in charge of the belts, he inserts his plug in any of the desk telephones and turns the generator crank which places him in instant communication with his chief.

It is seen from the above that all parties involved in the handling of the grain are in very close and immediate touch with one another, providing a most flexible system of handling the loading of these large grain boats which otherwise, considering the size of the elevator, bridge and pier, would be a most cumbersome and unwieldly operation. The system was designed and installed by the Western Electric Company. This is another example of how the telephone has been put to special work.

Cutting Sheet-Steel Piling With Oxy-Acetylene Blowpipe.

The Florida East Coast Railway Company is just completing the construction of a large drawbridge which spans the St. Johns River at Jacksonville, Fla. Lackawanna sheet-steel piling has been used in the construction of the protecting piers. This piling is driven down in sections. Each sheet or section consists of a three-eighth-inch web and is about 2.25 inches thick on the lock joint.

In all, approximately 860 feet of piling had to be cut off at a uniform height. An oxy-acetylene cutting blowpipe was used, employing Prestolite gas and compressed oxygen, both in portable cylinders. On account of the peculiar construction of the lock joints, the operator was handicapped in making speed, although the work was completed at an enormous saving over the old method of sawing through, which would have been an extremely slow and tedious operation.

At the lock joint practically four sections of metal had to be cut through, requiring frequent changes in the adjustment of the blowpipe. Nevertheless, it is stated that between 40 and 50 lineal feet of piling was cut in seven hours, one man handling the entire job. This is many times faster than the speed of the ordinary hacksaw, which on such a job would require the services of at least two men.

The cutting followed the pile drivers closely so that virtually no time was lost.

Direct-Reading Device for Computing Characteristics of Vacuum Tungsten Lamps.

It is well known that a change in the voltage applied to the terminals of an incandescent lamp changes the candlepower, current, and in consequence the wattage and the watts per candle. If these changes are followed from point to point, relations among the variables may be found and plotted as characteristic curves. The equations of these characteristic curves for tungsten lamps have been found by the Bureau of Standards, and a special application of these equations has been made in a device which gives a solution of problems involving voltage, candlepower, and watts per candle.

In this device the volt scale is movable, and, by setting it to the other scales at a point corresponding to the observed watts per candle, values of per-cent candlepower and of actual watts per candle may be read directly from the proper scales, or the converse problems may be solved. Use of this device results in a decided saving of time when compared with other methods of characteristic evaluation. In connection with the device are given tables of values used in its construction and practical examples illustrating scale settings. Copies of Scientific Paper No. 253 may be obtained without charge upon application to the Bureau of Standards, Washington, D. C.

Electric Trucks Used as Freight Car Shifters.

The use of electric motor vehicles for shifting freight cars on an industrial side track has been put to practical test at the new Fish Pier, at Boston, Mass., where five-ton General Vehicle trucks are regularly utilized to haul cars that have been unloaded, to a storage yard about 500 feet distant, so as to allow other cars on the same siding to be moved opposite the storehouse doors.

A chain coupling is attached to the bumper of the freight car, and the truck is run on the first speed. The car is hauled until it reaches the limits of the paved street opposite the pier, where it is pushed along the track by the truck backing against the other end.

Ordinarily the trucks are employed in hauling ice from the electrically operated freezer of the Commonwealth Ice and Cold Storage Company, to the various fishing schooners tied up at the pier, but this added service makes them of even greater usefulness.

Wireless Receiving Device Patented by Ashton and Curtis.

It is an open secret that the right to use zincite as the sensitive element of a wireless telegraph detector has been in dispute for a number of years.

This question has been at last definitely settled by the issue of a patent, as first and original inventors, to Ashton and Curtis on July 6, 1915, No. 1,145,658, after a long and strenuous contest in the Patent Office comprising three interference proceedings. The right of Ashton and Curtis to use zincite for this purpose has been confirmed by all of the tribunals of the Patent Office, namely the Examiner of Interferences, the Board of Examiners-in-Chief, and the Commissioner of Patents.

The patent comprises the exclusive right to make, use and sell, in an oscillation receiver: (1) the natural oxid of zinc, commonly designated as zincite, as an element of a wirelsss telegraph detector; (2) the combination in a wireless telegraph detector of zincite combined with any electrical conducting medium; (3) any oxid of zinc comprising the formula 80.26 per cent of zinc and 19.74 per cent of oxygen, which is the proportion in which zinc and oxygen combine to form an oxid of zinc, used in a wireless receiver; (4) the structure of an oscillation detector instrument comprising the eccentric supporting relation of the parts whereby all portions of the face of the sensitive element may be contacted with the opposing operative element of the detector.

Bristol Company Receives Grand Prize for Recording Instruments.

The Bristol Company, Waterbury, Conn., has been awarded the Grand Prize (the highest award) for recording instruments displayed at the Panama-Pacific International Exposition, San Francisco, Cal. The Bristol exhibit of these instruments is comprehensive and very instructively arranged. An illustrated description thereof was published on page 1131 of our issue of June 12, 1915.

New Reflectors for High-Efficiency Window Lighting.

It is well known that in order to obtain the most definite and efficient results from a reflector it must be designed for particular use with a particular lamp, that is, a lamp of a definite size and shape and in a definite relative position as regards the reflector must be used. Since the advent of the gas-filled tungsten lamps in smaller size, particularly the 100-watt type, new conditions are met when these lamps are to be used for store-window lighting. This is especially true where reflectors using spectral or true mirror reflection are employed. The new lamps have a very concentrated filament, the center of which is located differently from the corresponding size of the vacuum type lamp.

Fig. 1.—"Jove" Reflector.

Fig. 2.—"Jupiter" Reflector.

To meet the demand for reflectors especially suitable for the new 100-watt gas-filled lamps, two new types of reflectors have recently been placed on the market. These are of the silvered-mirrored-glass type with corrugated reflecting surfaces. The corrugations are somewhat smaller than the earlier types of these reflectors. The reflector shown in Fig. 1 is called the Jove reflector and is designed for windows ranging from one to one and one-half times in height compared to the depth. The reflector shown in Fig. 2, known as Jupiter reflector, is arranged for windows whose height is about twice the depth. These reflectors are shaped to give practical uniform illumination on what is known on the line of trin, the distribution curves for these reflectors being shown by Figs. 3 and 4, respectively.

Fig. 3.—Distribution from Jove Reflector.

These reflectors are to be mounted at the upper front edge of the window so as to throw the light downward and against the background where the window display is made. In order to secure the best results the upper front of the window should be draped, painted, or screened off in some manner so as to cut off all view of the lamps and reflectors from persons looking into the window at any position. This gives the proper conditions for effective window lighting in that the source is entirely concealed and the light is thrown upon the goods displayed.

Fig. 4.—Distribution from Jupiter Reflector.

These reflectors are ventilated so as to permit free convection of the heat from the lamps and they also are provided with a special backing to withstand high temperature indefinitely. These reflectors are made by the National X-Ray Reflector Company, 235 West Jackson Boulevard, Chicago, Ill.

Electric Steel Production.

There were, at the beginning of 1914, according to the *Elektrotechnische Zeitschrift*, 138 arc furnaces and 35 induction furnaces in operation for the production of steel. The arc system is thus far more generally in use, though judged on the basis of steel output the advantage would appear to be with the induction system. The opinion expressed in recent years that the induction furnace would prove the better of the two, has given place to the conviction that each system has its own special field of operation. So far as the sizes of the furnaces are concerned the problem of a construction for a capacity over 15 tons has yet to be solved. Larger furnaces than the 25-ton Heroult have not yet been constructed, and the practicability of this dimension has not been demonstrated as yet. The Girod system has attained the 15-ton margin, the Nathusius and Röchling-Rodenhauser 12 tons, while the production of castings on the Stassano method is limited to small units of no more than two tons. Nevertheless, units of 30 tons are still being built on the Heroult system and 20 tons on that of Frick. During 1913 the output of the electro-thermic steel works increased in Germany, Austria-Hungary and France, though the increase was less than in previous years. The total production in North America remains nearly stationary. On the whole, it is the general belief now—as against previous opinions to the contrary—that the electro-steel industry has a long period of development still confronting it, and that the experimental stage is far from having been passed.

Herewith is given a list of the several systems and their development in 1913 and 1914. Arc furnaces working and under construction: Heroult, 67; Girod, 27; Nathusius, 9; Stassano, 10; Keller, 6; Chaplet, 8; others, 11; total, 138. Induction furnaces working and under construction: Kjellin, 10; Röchling-Rodenhauser, 17; Frick, 6; others, 2; total, 35. There are, therefore, 173 electric furnaces altogether.

West Virginia Coal.

West Virginia broke all records in coal production in 1914 with an output of 71,707,626 short tons, valued at the mines at $71,391,408. This was an increase of about a half million tons over the production in the previous banner year, 1913. The number of fatal accidents in the mines, according to the Bureau of Mines, was 556.

Current Electrical News

ATLANTIC STATES.

CHICOPEE, MASS. — The Fisk Rubber Company will erect a five-story mill, 600 by 110 feet, to be equipped with motorized machinery. The new mill will give employment to about 2,000 persons and will cost about $300,000. W.

NEWBURYPORT, MASS. — Philip Cabot and Lester L. Flint, of Boston, have taken over the management of the Newburyport Gas and Electric Company. Sidney W. Winslow, president, and Andrew W. Rogers, treasurer, retire because of other business, though retaining an interest. The company has 2,300 gas customers and 500 electric customers, and it is the intention of the new management to make a campaign for new business, especially along electric lines, which are capable of large development. The construction of new lines and the installation of generating equipment will follow.

PHILADELPHIA, PA. — A Philadelphia syndicate, headed by Edward E. Mandeville, is forming a merger of gas, power and light companies in New York, according to papers filed with the Public Service Commission of that state. The company to be known as the Orange County Public Service Company, will control the Orange County Company, the Cuddebackville Company, and the Monticello Light and Power Company, embracing a territory which covers the cities of Middletown, Monticello and Port Jervis, as well as the towns of Cuddebackville, Otisville and Howells, with a population of nearly 40,000. The syndicate controls the Port Jervis Light and Power Company and the Port Jervis Traction Company.

BACONTON, GA. — The sum of $5,000 will be expended for a light plant. Address J. B. Miller.

COOLRIDGE, GA. — The Council is planning to extend electric light system. Address the mayor.

NORTH CENTRAL STATES.

LIMA, O.—The Ohio Electric Company in accordance with the terms of its franchise, under which it is required to bury all transmission wires in the business district of the city, will let contracts for the work in a short while. It is estimated that the work will take five or six weeks. L.

WELLSVILLE, O.—The city will construct an electric light plant as soon as it can dispose of bonds which have been authorized for that purpose. No bids were received for them at a recent date fixed for the sale, as buyers declared the rate of four and one-half per cent to be too low at this time.

OWOSSO, MICH.—An electric light system for the boulevards will be installed at a cost of $25,000. Address the president of the Owosso Improvement Association.

DURAND, WIS. — The Durand Light and Power Company has increased its capital from $35,000 to $70,000.

ROCHESTER, MINN.—A new electric light plant will be erected in this city. Address the chairman of the City Council.

MARBLE ROCK, IOWA. — Bonds to the sum of $4,500 have been voted for the erection of electric light system here. Address the town clerk.

CONCEPTION JUNCTION, MO.—An electric light plant will be erected here by T. W. Costello.

KANSAS CITY, MO. — The Blue Springs, Mo., electric light and ice plants, owned by J. C. Waugh, of Kansas City, was practically destroyed by fire July 29, part of the ice machinery being saved. The building was frame and iron. The loss was about $5,000. Mr. Waugh will replace machinery at once. There was a 32-horsepower oil engine and a 20-kilovolt-ampere generator in the lighting plant. M.

KNOBNOSTER, MO.—The Johnson County Light and Power Company has been incorporated with a capital of $5,000, by S. A. Kelley and others.

KILLDEER, N. D.—R. C. Horn, of Dickinson, will install an electric light plant here.

KINGSTON, N. D.—The City Council is planning improvements to the electric light plant. Address the town clerk.

PERU, NEB. — The Peru Electric Lighting and Power Company plans to install an 80 horsepower boiler. Address H. Hallenbeck, manager.

SHELTON, NEB.—An $8,000 electric light system will be established. Address the town clerk.

BELLEVILLE, KANS.—The Commercial Club and citizens are urging upon the city officials the installation of a white way street lighting system. It is said the officials favor it. M.

CHAPMAN, KANS. — The citizens voted almost unanimously to issue $8,000 in bonds to buy the electric light plant and complete it. M.

KANSAS CITY, KANS.—The Public Utilities Commission of Kansas has approved the transfer of the holdings of the Arkansas City Gas and Electric Light Company and the property of the Arkansas City Water Company to the Kansas Gas and Electric Company. The deal has been pending for several years. It is said the consideration for the gas and electric property and company was $300,000. It had been owned by A. A. Newman and Son. M.

MANHATTAN, KANS.—The Manhattan Ice, Light and Power Company is said to be planning the remodeling of its building, and the reequipment of the electric plant at a cost of about $30,000. E. A. Wright is manager. M.

SOUTH CENTRAL STATES.

LOUISVILLE, KY.—Electricity is to supply the power for the operation of the plant, which local business men are organizing to take over and rebuild, of Holloway Tobacco Warehouse, on A Street. Promoters of the new company expect to price the stock low and to enlist tobacco growers in the venture.

PADUCAH, KY. — The Foreman Automobile Company will install its own electric power and lighting plant in a $35,000 garage which it is to build. The structure will be two stories, 144 by 115 feet. G.

BATON ROUGE, LA.—The Baton Rouge Electric Company has had plans prepared for an electric station. The equipment will include three 500-kilowatt Curtis turbines, three 400-horsepower water tube boilers, superheaters, etc. Address Stone & Webster Engineering Corporation, 147 Milk Street, Boston, Mass.

NEW ORLEANS, LA.—It is understood that the Commission Council has broken off negotiations with the New Orleans Railway and Light Company, with respect to the residential lighting rate controversy and has authorized Commissioner Lafaye to engage an expert for the purpose of making a survey, preparing plans and superintending the construction of a publicly-owned lighting plant.

AUSTIN, TEX. — J. C. Andrewartha, of Dallas, consulting engineer of the Southwestern Traction Company, has advised the board of commissioners of Travis county, at Austin, that the company plans to build a trunk line interurban railway from Dallas to this city, with branch lines to San Angelo, Lockhart and a number of other towns. The proposed system will embrace several hundred miles of track. The same interests comprise the Northwestern Traction Company, which plans to construct an interurban railway from Dallas to Denton. D.

DALLAS, TEX.—The Texas Power and Light Company will supply the towns of Troy, Eddy, Bruceville, Thrall, Lorena, and Holland with electric current for lighting and power purposes from the high-power long-distance transmission line which it is building from its station at Waco to Austin, about 100 miles. The company has also taken over the local electric light plants at Moody, McGregor and Thorndale, on the new line. D.

DECATUR, TEX.—The municipal electric lighting system here will be extended. D.

JOURDANTON, TEX. — The construction of a municipal electric light and power plant here has been started by Hudson & Braden, contractors, of San Antonio. D.

MERKEL, TEX.—The Abilene Gas and Electric Company has purchased the electric light and power plant of

the Merkel Electric Light Company, and will connect the latter with its central station at Abilene by means of a transmission line. D.

PLAINVIEW, TEX.—The Malone Ice and Light Company, which is building a system of transmission lines in this section, will supply current for light and power to the towns of Lubbock, East Floydada, Lockney, Abernathy and Hale Center. It will also furnish power for operating many irrigating pumping plants. D.

SAN ANGELO, TEX. — Improvements to cost close to $50,000 are to be made to the plant and system of the San Angelo Water, Light and Power Company within the next several months. This announcement was made by officials of the company. Among the improvements will be the installation of several large machines at the power plant. Address general manager.

WESTERN STATES.

BOZEMAN, MONT.—Bids for materials and installation of an ornamental lighting system in special improvement district 100, will be recived by C. A. Speith, city clerk, August 19. Plans and specifications for the improvement are on file in the office of official named. According to plans announced, there will be approximately 74 combination lighting fixtures and trolley suspensions, 16 three-light cluster posts, 8,100 lineal feet trenching in concrete, 150 lineal feet trenching in earth, 150 lineal feet trenching in bitulithic, 9,200 feet of two No. 6 park cable, eight conduits, etc. For further information, apply to city clerk. O.

DILLON, MONT.—The City Council, according to Henry G. Rogers, clerk, has created a special improvement district, wherein an ornamental lighting system will be installed. The territory included in the district is Pacific and Washington Streets, between Cornell and Helena Streets, and from Idaho and Orr Streets to Glendale. It is understood bids for materials and installation will be received in a short time by City Clerk Rogers. O.

CARLSBAD, N. M. — The electric light and power plant serving Carlsbad and the government reclamation project will be materially enlarged. The lower power dam on the Pecos River will be raised, another large generator installed and 6 miles of line into town rebuilt to carry 6,600 volts. Address manager of the Carlsbad Power Company.

SANTA ROSA, N. M.—Plans are being made for an electric light plant and water system for this city. V. A. Harding, of Burns & McConnell, constructing engineers of Kansas City, was here recently in connection with the proposition.

BURLINGAME, CAL.—Application has been made by the Pacific Gas and Electric Company to build new feeder lines into this city.

LOS ANGELES, CAL.—The City Council has instructed the city engineer and city attorney to prepare an ordinance for the ornamental lighting of Hobart Boulevard from Washington Street to Harvard Boulevard.

HEPPNER, ORE. — The Heppner Light and Water Company will soon begin work on a transmission line from here to the town of Ione.

MEDFORD, ORE.—If the voters of this city, at a coming election, express a desire to operate a municipal distributing light and power system in the city the California-Oregon Power Company, which at present supplies current to a majority of the cities in southern Oregon, has agreed to sell its distributing lines in Medford to the city. The matter will be passed on in the near future. O.

SILVERTON, ORE.—The City Council recently retained Prof. C. R. Reid, of the University of Oregon, to make investigations and preliminary estimates of the cost of establishing a municipal lighting system in this city. When completed the matter will be placed before the Council, who has announced its intention of calling a special election to vote on the proposition. O.

CENTRALIA, WASH.—A bond of $10,000 has been filed by H. G. Fleischhauer, who recently entered into a contract to furnish electric current for both light and power to this city at a rate much less than that charged by the Washington-Oregon Corporation. In filing the bond, Fleischhauer guarantees to carry out his contract, which provides for the erection of a power house near Centralia, erection of transmission lines and furnishing of service by October 1, 1915. In the Federal Court, at Tacoma, the Washington-Oregon Corporation which serves this city and vicinity, is striving to obtain a permanent injunction to restrain Fleischhauer from carrying out the terms of his contract, or operating in any territory in which the Washington-Oregon Corporation now supplies service. O.

PE ELL, WASH. — This city is negotiating with C. C. Smith, of The Morton Electric Company, of Morton, Wash., relative to the installation of an electric light and power plant to serve this city. O.

PRESCOTT, WASH.—The lines of the Pacific Power and Light Company, according to statement of officials of the company, will be extended from Waitsburg to this city, construction to start in the near future. The company is now furnishing current to a number of small towns in Eastern Washington. O.

PRESCOTT, WASH.—The Pacific Power and Light Company has been granted a light and power franchise in this city, service to be installed within four months from date.

SEATTLE, WASH. — The application of the Puget Sound Traction, Light and Power Company for a franchise to extend its service through the south end of Kings County, will be heard by the county commissioners on August 31.

STANWOOD, WASH.—A franchise to furnish power and light to this city has been granted by City Council to George W. Kunze, who will take over the present lighting plant owned by L. F. Wuery. The franchise covers a period of 50 years, and the new owner plans to immediately increase the present plant, and make a number of extensions. O.

TACOMA, WASH.—The City Council has ordered the installation of street lights in Lighting District No. 5,507, at a cost of $4,883.

PROPOSALS.

LIGHTING FIXTURES. — Sealed proposals will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until September 2, 1915, for lighting fixtures to be installed in the steerage barracks and storehouse for the United States quarantine station at Portland, Me. Drawings and specifications may be obtained from the custodian at the quarantine station, or at the office of the supervising architect, Washington, D. C.

ELECTRICAL EQUIPMENT. — Sealed proposals will be received at the office of the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until August 24, 1915, for furnishing 8,000 feet of interior communication cable; 1,800 feet of telephone cable; 200,000 feet of double flexible silk conductor; miscellaneous twin conductor wire and miscellaneous bronze silicon wire, as per Schedule 8654, all for delivery at Navy Yard, Brooklyn, N. Y.; eight watt-hour meters, as per Schedule 8642, for delivery at Navy Yard, Boston, Mass.; two non-reversible direct-current motors, as per Schedule 8634, for delivery at Navy Yard, Newport, R. I.

NEW PUBLICATIONS.

BY-PRODUCTS OF COAL.—The Canadian Department of Mines has issued Bulletin No. 323 entitled "Products and By-Products of Coal," by Edgar Stansfield and F. E. Carter. This describes the methods of producing coke, gas, ammonia and tar, and discusses their properties and uses.

NEW INCORPORATIONS.

MASON CITY, IOWA—The Midland Electric Company has been incorporated with a capital of $50,000, by A. W. Zahn and others.

ROYSE CITY, TEX. — Royse Ice and Electric Company. Capital stock $16,000. Incorporators: J. T. Murphy, A. F. Davis and E. C. Murphy.

JACKSON, ALA. — The Jackson Electric Company has been incorporated with a capital of $5,000. The company is to establish a 15-ton ice plant.

BARTLESVILLE, OKLA. — The Anderson Electric Company has been organized here with a capital stock of $3,000. J. F. Anderson is interested.

URICH, MO.—The Urich Electric Light and Power Company has been incorporated with a capital of $5,000, by J. J. Wright, Henry Buesse and others.

BARTLESVILLE, OKLA. — The Anderson Electric Company has been incorporated with a capital of $3,000, by J. P. Anderson, T. M. Finney and others.

PEPIN, WIS.—The Pepin Electric Company has been organized with a capital of $5,000. The incorporators are C. J. Thies, O. E. Jackson and C. J. Johnson.

HIGHMORE, S. D.—The Highmore Electric Light Plant and Power Company has been incorporated with a capital of $25,000, by C. V. Armstrong and others.

ENID, KANS.—The Prince Electrical Equipment Company has been incorporated with a capital of $3,000, by C. C. Wilcox, J. Stuart Trimble and C. C. McVay.

ENID, OKLA.—The Prince Electrical Equipment Company has been organized with a capital of $3,000 by

C. C. Wilcox, J. Stuart Trimble and C. C. McVay.

ROYSE CITY, TEX.—The Royse Ice and Electric Company has been incorporated with a capital of $16,000, by J. T. Murphy, A. F. Davis and others.

NEW YORK, N. Y.—The Reinforced Propeller and Insulating Company, Incorporated. Incorporators: Charles M. Berry, George W. Springsted, Jr., and Howard Huntington.

NEW YORK, N. Y.—Improved Arc Light Company, Incorporated. Capital, $4,000. Incorporators: Abraham Greenberg, Harry Turk and Jacob Wagner, all of Brooklyn, N. Y.

DAWSON SPRINGS, KY. — The Dawson Light and Power Company has been incorporated with a capital of $7,500 by James Clark, Jr., Walter S. Clark and Brent Hart.

ROME, N. Y.—Electric Rod Mill, Incorporated; to manufacture insulated wire, etc. Capital, $5,000. Incorporators: Herbert T. Dyett, Frank M. Potter, Jr., and Clarence R. Keeney.

LOCKHART, TEX.—The Citizens' Water Works, Electric Light and Ice Company has been organized with a capital of $100,000, by E. B. Coopwood and others. New plant will be built.

NEW YORK, N. Y.—Ivan T. Johnson Company, Incorporated; electrical contractors, engineers, etc. Capital, $20,000. Incorporators: Ivan T. Johnson, Warren Bigelow and Herbert M. Simon.

INDIANAPOLIS, IND.—The Electric House Lighting Company has been organized to deal in electrical fixtures. The company is capitalized at $25,000. Incorporators: Carl L. Rost, John M. Schmid and Earl F. Gray.

YOUNGSTOWN, O.—The Bothwell Electric Company has been incorporated by Howard Bothwell, Perl M. Bothwell, Ruth Lafferty, J. H. C. Lyon and G. F. Hammond. The company is capitalized at $15,000.

NEW YORK, N. Y.—The Irving S. Van Loan Corporation has been established to deal in electrical machinery, etc. Capital, $5,000. The incorporators are Irving S. Van Loan, John B. Hyatt and William Phipps.

CINCINNATI, O.—The Volto Electric Company has been incorporated with a capital of $30,000, to deal in electrical accessories. The incorporators are Henry F. Grote, P. J. Craig, William Koch, Alfred C. Craig and Frank J. Grote.

PITTSBURGH, PA.—A charter has been granted the Advance Electric Company. The company is capitalized at $30,000, and will manufacture, sell and deal in and with electrical devices of all kinds. The incorporators are: Frank M. Kernan, A. J. Wayman and A. B. Wayman.

CHICAGO, ILL.—The O. K. Electric Company has been incorporated with a capital stock of $10,000. The company is to manufacture electric appliances and do a general manufacturing business. The incorporators are Richard M. Winters, J. H. Westover and Emil Kekich. Z.

CITY POINT, VA. — Hopewell Electric Light and Power Company, Incorporated, Hopewell, City Point, Va. Light and power plant. Maximum, $50,000; minimum, $5,000; par value $10. W. H. Hoyt, president; H. J. Ingram, Jr., vice-president; C. T. Morris, secretary and treasurer, all of Hopewell, Va.

FINANCIAL NOTES.

At a special meeting, stockholders of the New England Telephone & Telegraph Company authorized an increase in capital stock from $50,000,000 to $75,000,000. Directors have formulated no definite plan for use of the additional stock. There is still about $3,000,000 of the previously authorized $50,000,000 stock unissued. It is believed that there will be no sale of the newly authorized stock until late in the year or early in 1916.

Brooklyn Rapid Transit gross income made a comparative gain of $2,000 per day during July, an increase for the month of approximately $60,000. This starts the new year off in good shape and as in the case of Boston Elevated is the first monthly gain in gross since March. The June quarter produced a shrinkage in gross of $123,000 and even the fiscal year to June 30 resulted in no gross gain save as provided through absorption of the Coney Island & Brooklyn.

A plan for the consolidation of the Providence Telephone Company with the New England Telephone & Telegraph Company has been submitted to the stockholders of the local corporation. The combination is to be effected by an exchange of stock on the basis of four shares of New England Telephone & Telegraph for five shares of Providence Telephone stock. In a letter to stockholders, the Industrial Trust Company of Providence, which has been appointed as depositary, explains that if on or before November 1, 50,000 shares of the capital stock of the Providence Telephone Company shall have been deposited, the New England Telephone & Telegraph Company shall be under obligations to exchange its stock for the stock deposited on the basis outlined, but if 30,000 shares are deposited the exchange will be at the option of the New England company. A condition of the plan is that several of the directors of the Providence company shall continue as directors of the New England company. Until it is known whether the plan is generally approved by the stockholders of the local company no attempts will be made to work out any operating details. No change in rates will be made it is stated. The par value of the stock of the Providence company is $50, but its present market price is $96. The company pays an eight-per-cent dividend and has a surplus of $500,000. The capitalization is $5,000,000.

Reports of Earnings.

NORTHERN OHIO TRACTION & LIGHT.

	1915	1914
June gross	$ 331,977	$ 317,780
Net	131,098	118,255
Surplus after charges	78,594	67,235
Balance after preferred dividends	62,272	52,144
Six months' gross	1,756,652	1,721,701
Net	655,005	662,065
Surplus after charges	346,540	360,230
Dividends	248,605	270,113
Balance after preferred		

AMERICAN LIGHT & TRACTION.

The American Light & Traction Company has issued a statement of earnings for the year ended June 30, 1915, compared as follows:

	1915	1914
Subsidiary earnings	$3,980,302	$3,697,743
Miscellaneous	754,962	717,867
Gross earnings	4,735,264	4,415,611
Expenses	157,600	139,466
Surplus	4,577,664	4,276,145
Preferred dividends	854,172	854,172
Balance	3,723,492	3,421,973
Common dividends	3,106,665	2,817,455
Balance	616,827	604,518
Previous surplus	9,577,664	8,973,146
Profit and loss surplus	10,194,491	9,577,664

PACIFIC TELEPHONE & TELEGRAPH.

The Pacific Telephone & Telegraph Company reports for the six months ended June 30, 1915, as follows:

	1915	1914
Gross	$5,026,500	$4,766,791
Net	1,127,865	1,159,932
Charges	615,340	568,527
Preferred dividend	480,000	480,000
Surplus	32,525	111,405

ONTARIO POWER OF NIAGARA FALLS.

Income account of Ontario Power Company of Niagara Falls, and Ontario Transmission Company, Limited, for the six months ended June 30, shows:

	1915	1914
*Gross earnings	$ 753,384	$ 739,514
Expenses and taxes	160,100	111,123
Net earnings	593,284	628,392
Other income	87,667	53,076
Total income	680,951	681,467
Refunding expenses	38,322	.....
Int. Ont. Pw. 1st 5s	255,254	249,716
Ont. Transmission 1st 5s	46,750	47,550
Ont. Pwr. deb. and notes	203,439	148,950
Balance	137,186	235,251

*Less purchased power and government rentals.

Decrease in net for 1915 due to purchase of power not at present used but necessary to take care of long-time contracts which will become operative during last half of present year.

GREAT WESTERN POWER.

(Western Power Corporation Subsidiary.)

Great Western Power Co. for the year ended June 30, 1915, reports as follows:

	1915	1914
Gross earnings	$2,770,963	$2,689,448
Expenses and taxes	820,381	1,005,627
Net earnings	1,950,582	1,683,821
Other income	199,342	228,164
Total income	2,149,924	1,911,985
Bond interest	1,243,130	1,182,698
Surplus	906,794	729,287

NORTHERN STATES POWER.

(And Subsidiaries.)

	1915	1914
June gross	$ 369,879	$ 321,311
Net after taxes	197,784	164,275
Twelve months' gross	4,765,096	4,247,413
Net after taxes	2,654,370	2,223,993
Surplus after charges	1,151,941	.....
Balance after preferred dividends	564,872	.....

GEORGIA RAILWAY AND POWER COMPANY.

(and subsidiaries)

	1915	1914
June gross	$ 511,138	$ 522,047
Operating exp. & tax.	294,983	312,881
Net earnings	216,154	209,166
Six months' gross	3,157,834	3,097,746
Operating exp. & tax.	1,858,300	1,790,709
Net earnings	1,299,533	1,307,037

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Aug. 9	Aug. 2
American Tel. & Tel. (New York)	122¼	121½
Commonwealth Edison (Chicago)	133½	134½
Edison Electric Illuminating (Boston)	231	235
Electric Storage Battery common (Philadelphia)	65¾	53
Electric Storage Battery preferred (Philadelphia)	65¾	53
General Electric (New York)	171	171¼
Kings County Electric (New York)	119	119
Massachusetts Electric common (Boston)	4⅞	5
Massachusetts Electric preferred (Boston)	34	34
National Carbon common (Chicago)	147	134
National Carbon preferred (Chicago)	119½	120
New England Telephone (Boston)	131	131
Philadelphia Electric (Philadelphia)	23¾	23¼
Postal Telegraph and Cables common (New York)	76½	74
Postal Telegraph and Cables preferred (New York)	66	65
Western Union (New York)	70⅝	68½
Westinghouse common (New York)	112¼	101¼
Westinghouse preferred (New York)	131	130

FOREIGN TRADE OPPORTUNITIES.

[Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch offices at Boston, New York, Atlanta, Chicago, St. Louis, New Orleans, Seattle and San Francisco. Write on separate sheet for each item and give file number.]

NO. 17,685. ELECTRICAL GOODS.—An American consular officer in Wales has transmitted a detailed report relative to an opportunity for the sale of electric fans, irons, cleaners, lamps, etc. A copy of this report may be had on application to the Bureau of Foreign and Domestic Commerce or its branch offices.

NO. 17,722. INSULATING MATERIAL. — An American consular officer in Chile reports that a machine company in his district desires to purchase tubes which are used for insulating purposes. Sizes should be 7, 9 and 11 millimeters, outer diameter. A sample of the tube may be examined at the Bureau of Foreign and Domestic Commerce or its branch offices. References are given. Correspondence may be conducted in English.

NO. 17,728. WIRE.—The Spanish Government by royal decree has authorized the Minister of the Interior, through the General Director of Post and Telegraph, to buy 35 tons of galvanized wire, two millimeters in diameter; 40 tons, three millimeters in diameter; 100 tons of four millimeters; and 25 tons of five millimeters. This wire is to be used in the national telegraph and telephone service. Offers should be submitted in Spanish. The address of an official to whom communications should be sent may be had on application to the Bureau or its branch offices.

PERSONAL MENTION.

MR. C. M. PIHL, formerly of the Pennsylvania Utilities Company, of Easton, Pa., has been appointed consulting electrical engineer of Phillipsburg, N. J.

MR. J. WASSON, who was for some time connected with the commercial department of the Toledo Railway and Light Company, has become connected with the "Electric Shop," of the Union Gas and Electric Company, of Cincinnati, as a salesman.

MR. LEWIS L. HOLLADAY announces that henceforth he will be associated in his practice of consulting engineering in the field of power plants, utilities and industries, with Mr. Henry Negstad, under the corporate name of Holladay, Negstad & Company, at 109 North Dearborn Street, Chicago, Ill.

MR. W. P. COCHRAN, formerly branch manager of the Westinghouse Electric and Manufacturing Company, at Baltimore, Md., has been appointed assistant district manager of the Philadelphia district, including Baltimore, and will make his headquarters in the former city. Mr. M. H. Jones, assistant to manager, will have charge of the Baltimore branch office.

MR. GEORGE H. HUDSON, who succeeds Day Baker as New England manager for the General Vehicle Company, Long Island City, N. Y., is a native of Gloucester, Mass. He has been identified with automobile interests for many years, having been manager of the Boston branch of the American Locomotive Company. For the past two years Mr. Hudson has had charge of the gasoline truck department of the General Vehicle Company's business at Boston.

PROF. A. M. WILSON, of the University of Cincinnati, addressed members of the Cincinnati Section of the National Electric Light Association and the Mutual Benefit Association of the Union Gas and Electric Company, at a joint meeting held last week. He spoke on the opportunities to be found in work with public service corporations today. President W. W. Freeman, of the Union Gas and Electric Company, who presided, devoted some remarks to the same object. A musical program followed the addresses.

OBITUARY.

MR. BENJAMIN L. CATES, who died recently at Philadelphia, Pa., was a well known electrical contractor, having been identified with the industry for over 25 years. He organized the Pennsylvania Electrical Equipment Company, and in 1910 organized the firm of Cates & Shepard, with Frederick M. Shepard. He was actively interested in civic and professional work, was one of the charter members of the Philadelphia Electrical Contractors' Association, and president of that organization for several years. He was at one time a national director of the National Electrical Contractors' Association. He retired from business about a year ago. He was an active member of the Jovian Order, and had many friends to whom his untimely death has come as a great shock.

MR. ALBERT SILVA, secretary of the Union Light, Heat and Power Company, of Newport and Covington, Ky., died on Saturday, August 7, at an Indianapolis hospital, following an operation for the removal of a cancerous growth. He was 70 years old. Mr. Silva was born in Milan, Italy, coming to this country with his parents as a child. He was a Union veteran, serving in the army for several years after the war. He resided in Newport for the past 40 years, serving in several city offices with high credit, and conducting an expert accounting business. His knowledge of accounting and his familiarity with municipal law resulted in the offer to him of the office of secretary of the Union Light, Heat and Power Company, which he held at the time of his death. His widow and seven children constitute the immediate family surviving. Funeral services were held at the home.

MR. EDWARD H. HOYT, a leading electric railway engineer of New England, died at his home in Haverhill, Mass., August 6, aged 66 years. Mr. Hoyt began his career in the leather business, but later in life took courses in electrical engineering and entered the employ of the Haverhill & Groveland Street Railway Company, afterward becoming electrical engineer for the Merrimack Valley Street Railway Company. Following the consolidation of these lines, he became electrical engineer for the Haverhill & Georgetown Street Railway Company. Later he became president of this road and was also prominent in the People's Telephone Company, of Haverhill. He served in the Massachusetts House of Representatives in 1898 and 1899. He resigned to accept a commission in the Engineering Corps of the army, on the outbreak of the Spanish-American war, and was stationed at forts in Boston Harbor. Mr. Hoyt was a Mason, an Elk and a member of the Ancient and Honorable Artillery Company. He left a wife and two married daughters.

DATES AHEAD.

American Institute of Chemical Engineers. Seventh semi-annual meeting, Los Angeles, Cal., August 16-19; San Francisco, Cal., August 25-28. Secretary, J. C. Olsen, Cooper Union, New York, N. Y.

International Association of Municipal Electricians. Annual meeting, Gibson Hotel, Cincinnati, O., August 24-27. Secretary, C. R. George, Houston, Tex.

Indiana Electric Light Association. Annual convention, Hotel Deming, Terre Haute, Ind., September 8-10. Secretary, T. Donahue, La Fayette, Ind.

Pennsylvania Electric Association. Annual convention, Bedford Springs, Pa., September 8-10. Secretary, H. N. Mueller, 435 Sixth Avenue, Pittsburgh, Pa.

Association of Iron and Steel Electrical Engineers. Annual convention, Hotel Statler, Detroit, Mich., September 8-11. Secretary, W. T. Snyder, McKeesport, Pa.

Northwest Section, National Electric Light Association. Annual convention, Portland, Ore., September 8-11. Secretary, N. W. Brockett, Pioneer Building, Seattle, Wash.

Association of Edison Illuminating Companies. Annual convention, Spring Lake, N. J., September 13-16. Secretary, George C. Holberton, San Francisco, Cal.

Electrical Supply Jobbers' Association. Quarterly meeting, Clifton Hotel, Niagara Falls, Ont., September 14-16. Secretary, Franklin Overbagh, 411 South Clinton Street, Chicago, Ill.

New England Section, National Electric Light Association. Annual convention, Mt. Kineo House, Kineo, Me., September 14-17. Secretary, O. A. Bursiel, 149 Tremont Street, Boston, Mass.

American Institute of Electrical Engineers. Panama-Pacific convention, San Francisco, Cal., September 16-18. Secretary, F. L. Hutchinson, 33 West Thirty-ninth Street, New York, N. Y.

American Electrochemical Society. Twenty-eighth general meeting, San Francisco, Cal., September 16-18. Secretary, Joseph W. Richards, South Bethlehem, Pa.

Illuminating Engineering Society. Annual convention, New Willard Hotel, Washington, D. C., September 20-23. Assistant secretary, Joseph Langan, 29 West Thirty-ninth Street, New York, N. Y.

International Engineering Congress, San Francisco, Cal., September 20-25. Executive secretary, E. J. Dupuy, Foxcroft Building, San Francisco, Cal.

American Mining Congress. Eighteenth annual convention. San Francisco, Cal., September 20-22. Secretary, J. F. Callbreath, Munsey Building, Washington, D. C.

Southeastern Section, National Electric Light Association. Annual convention, Grove Park Inn, Asheville, N. C., September 22-24. Secretary, George H. Wygant, Tampa, Fla.

Telephone Pioneers of America. Annual meeting, San Francisco, Cal., September 21-23. Secretary, R. H. Starrett. 15 Dey Street, New York, N. Y.

Jovian Order. Thirteenth annual convention, Hotel Sherman, Chicago, Ill., October 13-15. Mercury, Ell C. Bennett, Syndicate Trust Building, St. Louis, Mo.

With the Electrical Manufacturers

The Metals Coating Company of America announces the opening of an office at 100 Summer Street, Boston, Mass., which will be in charge of Herbert Jaques, Jr., who is prepared to furnish information and to demonstrate the Schoop metal-coating process to interested manufacturers.

Thomas Cusack Company, Chicago, Ill., through its supply department has issued a loose-leaf catalog covering all lines of supplies for painted and electrical outdoor advertising display. Colors, brushes, bulletin boards, reflectors, receptacles, sockets, flashers, transformers, time switches and sign-hangers' tools are illustrated and described as well as a complete line of electric-sign designs and illuminated painted boards. Additional catalog sheets will be issued periodically.

Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has just issued Bulletin No. 1093, devoted to engine-type direct-current generators. Standard two-wire and three-wire machines, known respectively as types I and IW are described and illustrated. These are built for ratings of 25 kilowatts and larger, with speeds corresponding to those of all standard engines in commercial service. The electrical and mechanical design and construction of these machines are described fully in the bulletin.

The Byllesby Mercantile Corporation, a trading company to build up commerce between the United States and Central and South America, will be conducted entirely separate from the Byllesby steamship enterprise, the Carribbean & Southern Steamship Company, which is operating freight lines to Central and South America, and to Russia and Sweden. This concern is already incorporated and doing business under the name of the Byllesby Mercantile Corporation, with offices at 17 Battery Place, New York City.

Cooper Hewitt Electric Company, Hoboken, N. J., has issued Bulletin No. 61 which describes a new M-shaped tube which is used in the lamp outfits for photographic enlarging. These tubes are provided for either direct current or alternating current. They are 50 inches in length and are bent six times so as to form the rough outline of the letter M. This gives considerable area of source, which is especially desirable in enlarging work. The tube is mounted on a stand with its auxiliary.

Record of Electrical Patents

Issued by the United States Patent Office, July 27 and August 3, 1915.

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

PATENTS OF JULY 27, 1915.

1,147,700. Automatic Arc-Lamp Cutout. J. E. Boesch, Vancouver, B. C., Canada. Pull on lead wires cuts out lamp.

1,147,701. Automatic Lamp Cutout. J. E. Boesch. Modification of above; cutout located on post.

1,147,703. Electric Furnace. J. W. Brown, assignor to National Carbon Co., Cleveland, O. For treating granular material.

1,147,716. Automatic Telephony. C. L. Goodrum, assignor to Western Electric Co., New York, N. Y. Arrangement of selector and connector switches.

1,147,717. Lamp Receptacle. E. F. Guth, St. Louis, Mo. Integral structure having a socket and pockets where connections are made.

1,147,718. Process of Plating Aluminum. J. A. Hall, New Britain, Conn. After cleansing, article is electroplated in bath containing cyanide of soda and zinc carbonate and desired metal plated on the zinc surface.

1,147,753. Dry Battery. L. J. Schatzel, Fostoria, O., assignor of one-half to O. V. Maurer. Has depolarizing compound comprising carbon, manganese dioxide and potassium persulphate.

1,147,757. Insulator-Supporting Structure. C. P. Seyler, Pittsburgh, Pa. Bow-and-arrow type steel cross arm for three-wire lines.

1,147,783. Method of Treating Metal. E. C. Carter, assignor to National Cash Register Co., Dayton, O. For hardening a desired area of a piece of steel; heat applied by passing electricity into the material by pressing electrodes against it.

1,147,789. Electrical Heating Unit. R. W. Davenport, assignor to Detroit Stove Works, Detroit, Mich. A flat coil has a body of low thermal conductivity on one side and body of relatively high conductivity on other side.

1,147,795. Alarm Device on Windows. C. W. Ervin, Los Angeles, Cal. Circuit controlled by window screen.

1,147,799. Trolley-Line Anchor. L. A. Hausler, Chicago, Ill. Flukes held in extended condition by frangible pin.

1,147,818. Spark Plug. A. Schmidt, assignor to Champion Ignition Co., Flint, Mich. Particular structure and assembly of casing and insulator.

1,147,820. Electropneumatic Switch. W. M. Scott, Philadelphia, Pa. Circuit-breaker opened and closed by pneumatic device electrically controlled.

1,147,829. Warning-Indicator for Vehicles. F. Triest, San Francisco, Cal. Inscriptions selectively exhibited by appropriate push-buttons and lamp lighted with each inscription.

1,147,831. Restaurant Equipment. W. H. Vary and G. B. Parmenter, Chicago, Ill., assignors to said Parmenter. Electrically controlled conveyors and elevators to move trays to any point.

1,147,847. Electric Vulcanizer. O. C. Dennis, Chicago, Ill. Portable, resistance-heated device; heater automatically cut out on reaching vulcanizing heat.

1,147,859. Emergency Lamp and Box Therefor. I. Goldberg, New York, N. Y. Lamp having circuit open when in casing is automatically lighted on removal therefrom.

1,147,864. Automatic Telephone System. D. S. Huifish, assignor to Canadian Independent Telephone Co., Toronto, Canada. Automatic switch structure.

1,147,870. Wire Clamp. W. H. Kempton, assignor to Ohio Brass Company, Mansfield, O. For welding ear on grooved trolley wires.

1,147,895. Telephone System. N. C. Schellenger, Chicago, Ill., assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. Details of contacts and connections of central-energy system.

1,147,916 and 1,147,917. Electric Heater. A. O. Bailey, assignor to Gold Car Heating & Lighting Co., New York, N. Y. Structural details of car-heater casing.

1,147,928. Automatic Telephone-Exchange System. H. G. Dietl, assignor to Western Electric Co. Relative arrangement of relays, through which transmitter current is supplied, and release magnet of automatic switch.

1,147,932. Connector-Puller for Battery Terminals. B. Ford, Philadelphia, Pa. Device for relatively positioning battery post and connector end.

1,147,949. Pilot and Night Lamp. E. Keen, Brooklyn, N. Y. Auxiliary lamp mounted on pull-cord of main lamp socket, pull switch alternately connecting main lamp alone and main and auxiliary lamps in series. (See cut.)

1,147,950. Automobile Direction-Indicator. Z. Keough, Los Angeles, Cal. Particular solenoid arrangement for operating indicator.

1,147,951 and 1,147,952. Electric Heater. F. T. Kitchen, assignor to Gold Car Heating & Lighting Co. Structures for placing under car seat.

1,147,956. Self-Starter for Internal-Combustion Engines. W. D. Lutz, Allendale Borough, N. J. Switching arrangements for controlling electric motor and magnetic clutch for connecting motor with engine.

1,147,959. Combined Typewriting and Computing Machine. H. Marshall, Cleveland, O. Motor-driven.

1,147,973. Lamp-Support. J. C. Ramsey, Jr., assignor to Aiken Lamp Co., Franklin, N. H. Lamp pivotally mounted on dash and turned from seat, push-button in handle controlling circuit.

1,147,989. Electrical Liquid-Purifier. A. A. Towne, Long Beach, Cal. Liquid treated flows continuously through container and is maintained at constant level therein; also has electrode adjustable to maintain proper relation with liquid.

1,147,997. Conversation-Registering Circuits for Machine-Switching Telephone Systems. F. Aldendorff, assignor to Western Electric Co. Application of registers to automatic system.

1,148,014. Fire-Alarm System. F. Gottschalk, Stirling, N. J. Local alarm circuit intermittently actuates telephone switch hook.

1,148,044. Clip Device. J. G. Peterson, assignor to Manhattan Electrical Supply Co., Jersey City, N. J. Contact dip for switch.

1,148,054. Pumping System. H. F. Rosencrans, Durand, Mich. Electromagnetically controlled water-supply system.

1,148,062. Method of Utilizing Battery-Waste. C. E. Tucker, Hyde Park, Mass. Lead oxide produced by adding a flux to battery-waste, containing lead sulphate and lead oxide, and heating.

1,148,076. Stop-Motion Mechanism for Knitting Machines. W. W. Burke, Bennington, Vt., assignor of one-fourth each to J. E. Burke and A. J. Cooper. Electromagnetic mechanism operated when normal feed of yarn is interrupted.

1,148,101. Headlight. A. F. Kush, Toledo, O. Has several concave concentrically arranged casings each having a light source, all of which sources may be used independently or collectively to vary intensity of light.

1,148,106. Sparking Plug. F. Lux, Ludwigshafen-on-the-Rhine, Germany. Particular structure having main and branch terminals with different spark gaps.

1,148,115. Wrapper. L. D. Morton, assignor to Hinde & Dauch Paper Co., Sandusky, O. Carton for incandescent lamps.

1,148,126. Speed-Recorder. S. B. Storer, assignor to Chicago Electric Meter Co., Chicago, Ill. Chronometer-controlled electrical device makes impression at end of

1,148,128. Detector for Electric Lamps. C. L. Stryker, Buffalo, N. Y. Selected portions of lamp bulb are covered by shields.

predetermined time and returns marker to starting position.

1,148,137. **Signal Device for Automobiles.** J. F. Anderson, Seattle, Wash. Direction indicator operated by selective operation of electromagnets acting on paramagnetic member.

1,148,138. **Crucible-Lifting Mechanism.** T. B. Barr and F. G. Hoyer, South Bethlehem, Pa. Electrically operated means for opening the tongs.

1,148,141. **Telephone System for Railway Trains.** E. H. Boudwin, Philadelphia, Pa., assignor of one-sixth each to D. W. Harner, R. L. Worsing, C. M. Gage, J. A. Pfouts and A. E. Yohn. Inter-car system making connections through air line.

1,148,142. **Signaling System for Railway Trains.** E. H. Boudwin, assignor of one-sixth each to D. W. Harner, R. L. Worsing, C. M. Gage, J. A. Pfouts and A. E. Yohn. Modification of above in which connections are made through train line and track.

1,148,152. **Electric Battery.** F. S. B. de-Mello, Rio de Janeiro, Brazil. Employs oxysulphide of copper as depolarizer.

1,148,157. **Electromagnetic Brake.** J. L. Earl, assignor of seven-eighths to H. M. Cotten, Morgan City, La. Brake shoe forced against car wheel by magnetic induction.

1,148,179. **Insulated Rail-Joint.** T. H. McFarland and R. D. Lewis, Carnegie, Pa. Bars secured to abutting rail ends mechanically secured together but insulated.

No. 1,147,949.—Pilot and Night Lamp.

1,148,183. **Arc-Lamp Electrode.** W. R. Mott, assignor to National Carbon Co., Cleveland, O. For flaming arc; contains precipitated silica in finely divided state and incrusted with a phospho-boric compound.

1,148,184. **Electric Arc Lamp.** W. R. Mott, assignor to National Carbon Co. For direct current; negative electrode as above and positive electrode containing flaming materials.

1,148,189. **Metal Coating for Arc-Light Electrodes.** B. Perris, assignor to National Carbon Co. Coating of metal powder secured to electrode by binder.

1,148,218. **Battery-Tester.** E. L. Clark, assignor to National Carbon Co. For application to battery terminals; plunger raised on flow of predetermined current.

1,148,221. **Process for Electrically Welding Turbine-Blades.** S. Z. deFerranti, Hampstead, London, England. For securing blades to disk; carrying away of heat by latter during welding is prevented.

1,148,223. **Solder-Cored Wire.** V. Feeser, assignor to G. Rau, Doublefabrik, Pforzheim, Germany. Has a core carrying solder threads and sleeve inclosing same.

1,148,224. **Battery-Connector.** P. J. Fitzgerald, assignor to Fitzgerald Mfg. Co., Torrington, Conn. For connecting conductor to terminal of dry cell.

1,148,230. **Battery-Depolarizer.** M. E. Holmes, assignor to National Carbon Co. Dry-cell mix containing a perhydrol of manganese.

1,148,232. **Ammunition-Hoist Control.** J. D. Ihlder and W. D. Lutz, assignors to Otis Elevator Co., Jersey City, N. J. Involves two motors, co-operating in one direction and opposed in other.

1,148,240. **Slack-Cable Device.** D. L. Lindquist and D. Larson, assignors to Otis Elevator Co. For opening elevator motor circuit on slackening of hoist cable.

1,148,256. **Switch.** J. L. Schureman, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Alternating-current solenoid for successively operating switches for controlling resistance, etc.

1,148,272. **Electroplating Apparatus.** H. Aderer, assignor to J. F. Jelenko & Co., New York, N. Y. Arrangement of board carrying adjustable electrode supports and lamp serving as resistance and current indicator.

1,148,274. **Electrolytic Cell.** E. A. Allen and H. I. Allen, assignors to Electron Chemical Co., Portland, Me. Concrete cell body forms anode and gas chambers and supports electrodes.

1,148,279. **Self-Inductive Means for Electrical Oscillatory Circuits.** G. von Arco, Berlin, Germany, and R. H. Rendahl, Lillienholm, near Stockholm, Sweden. Self induction of flat disk coils varied by varying distances from each other.

1,148,294. **Mechanical Horn.** G. C. Dean, assignor to Lovell-McConnell Mfg. Co., Newark, N. J. Mechanical means for vibrating diaphragm driven by electric motor having axis normal to diaphragm.

1,148,295. **Electrical Contact Governor.** W. Deats, assignor to Otis Elevator Co. Operated by centrifugal governor balls.

1,148,296. **Elevator Service Register.** H. A. Desper, Worcester, Mass. Car movement mechanically operates register and electrically controls auxiliary register having resetable and cumulative members.

1,148,299. **Chain Switch-Pull for Electric Lights.** J. E. Eade, Providence, R. I. Insulating section in pull chain.

1,148,319. **Selective Signaling System.** R. N. Hill, assignor to Western Electric Co. Semaphores at way stations selectively operated from sending station; includes answer-back signals.

1,148,323. **Crane Trolley.** E. H. Kendall, assignor to Alliance Machine Co., Alliance, O. Structural arrangement of lifting drums and two driving motors.

1,148,325. **Traction Meter.** J. G. Kjellgren, Brooklyn, N. Y. Comprises indicators for showing when car is in motion, when motor circuit is in use and when excessive current is used, respectively.

1,148,332. **Electric Fan for Umbrellas.** S. Onyskow, assignor of one-half to L. Dulikrovich, Jenkins, Ky. Fan on umbrella rod above bows operated from electric motor in handle.

1,148,341. **Illuminated Sign.** W. H. Spencer, assignor to G. F. Spencer, New York, N. Y. Light in hood to edges of which signs are hinged, outer edges of sign being brought together.

1,148,343. **Method of Preventing Punctures in Electric Flame-Arc Furnaces.** E. Troye, assignor to Norsk Hydro-Elektrisk Kvaelstofaktieselskab, Christiania, Norway. Gas of suitable temperature and pressure is conducted between furnace lining and cover on its way to treatment in furnace.

1,148,348. **Electric Horn.** C. E. Avery, assignor to Manhattan Electrical Supply Co., New York, N. Y. Electromagnetically vibrated diaphragm.

1,148,354. **Automobile Lamp-Dimmer.** J. D. Carter, Denver, Colo. Special conformation of baffle plates in casing placed in front of lamp.

1,148,401. **Process for Treating Osier Bark.** E. Petz, assignor to Filzkorkfabrik Gesellschaft M. B. H., Vienna, Austria-Hungary. Spinning fibers, insulating material and cork flour simultaneously obtained.

1,148,411. **Electric Alarm.** R. S. Smith, Columbia, Miss. When service switch for lights is not connected alarm is sounded at predetermined time, giving notice that lights have not been connected.

1,148,436. **Fixture Support and Bracket.** W. R. Blain, Albany, Ore. Extensible, jointed, support secured to ceiling for supporting cord of pendant lamp and providing horizontal adjustment. (See cut.)

1,148,437. **Circuit-Breaker.** H. M. Boal, Corry, Pa. Line-relay armature makes and then breaks local circuit when attracted.

1,148,438. **Electric Coin-Controlled Lock.** G. G. F. Boswell, Indianapolis, Ind. Electromagnetically controlled lock has circuit closed by coin.

1,148,439. **Trolley-Wire Switch.** F. H. Boyle, Champaign, Ill. Details of construction.

1,148,442. **Train-Control System.** A. Casale, Scranton, Pa. Automatic train-stopping means operated on block system.

1,148,450. **Automatic Safety Stopping Device for Elevators.** A. A. Fuller, assignor of one-half to C. M. McCrum, Birmingham, Ala. Control circuit of normal brake controlled by governor cable operating emergency brake to first apply normal brake.

1,148,452. **Automatic Control for Musical Instruments.** A. F. Hauss, Aurora, Ind., assignor of one-third each to E. F. Oberheiman and G. Lubrecht. Details of make-and-break type of control.

1,148,458. **Substation Telephone.** O. M. Leich, assignor to Cracraft-Leich Electric Co., Genoa, Ill. Switch hook first connects transmitter and auxiliary batteries in series to signal, transmitter battery alone being connected in limiting position of hook.

1,148,464. **Controlling Device for Refrigerating Apparatus.** G. J. Sayer, Chicago, Ill. Pump motor controlled by valve regulating the amount of cooling fluid.

1,148,465. **Refrigerating System.** G. J. Sayer. Several valve-driving motors controlled according to positions of valves individually and collectively.

1,148,481. **Current-Indicator.** J. W. Ryan, assignor of one-half to L. L. Rowland, Overbrook, Pa. "On" and "off" indicator.

1,148,484. **Call-Box.** P. A. P. Davis, Baltimore, Md. Structural details of impulse transmitter.

Reissue. 13,950. Lightning-Arrester. F. S. Chapman, assignor to National Electric Specialty Co., Toledo, O. Arrangement of electrodes, etc., in vacuum device.

Electrical Patents of August 3, 1915.

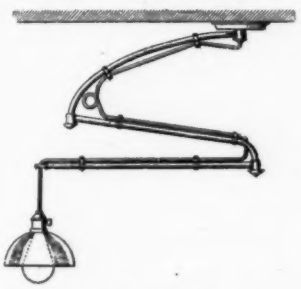
1,148,498. **Insulated Joint.** C. O. Burton, New Duluth, Minn. Insulating clamp for covering joint of line and branch wires.

1,148,521. **Transmitter for Wireless Telegraphy.** G. Marconi, assignor to Marconi Wireless Telegraph Co., New York, N. Y. Studs adapted to bridge spark gap mounted on rotary insulating disk which moves them through spark gap.

1,148,522. **Process for Regenerating Electrolytes.** O. C. Martin and F. Jaeger, Perth Amboy, N. J. Arsenic removed from sulfuric acid and copper sulfate electrolytic solutions.

1,148,523. **Water-Gage for Boilers.** W. S. Monroe and B. Schroeder, Chicago, Ill. Mounting of electric lamp for lighting gage glass.

1,148,538. **Antitheft Device for Incandescent Lamps.** J. Sachs, assignor to Hart & Hegeman Mfg. Co., Hartford, Conn. Prevents unauthorized removal of lamp from socket.



No. 1,148,436.—Adjustable Lamp Support.

1,148,551. **Dynamo-Mounting.** W. I. Thomson, assignor to Safety Car Heating & Lighting Co., Newark, N. J. Support and gearing of axle-driven generator.

1,148,564. **Railway Switch and the Like.** W. A. Austin, assignor to A. T. Austin, Omaha, Neb. Motor-operated switch point and means for moving it automatically if the switch parts are accidentally displaced.

1,148,592. **Alternating-Current Motor.** O. Knopfli, assignor to Maschinenfabrik Oerlikon, Oerlikon, near Zurich, Switzerland. Compensated repulsion motor.

1,148,602. **Valve.** J. McLear, Chicago, Ill. In a vacuum-producing device, valves are electromagnetically controlled by the degree of vacuum.

1,148,627. **Sad-Iron.** E. E. Rose, assignor to Westinghouse Eectric & Mfg. Co., E. Pittsburgh, Pa. Connections of heater with service wires are made inside hollow insulating handle.

1,148,628. **Vapor Electric Apparatus.** Y. Sakai, assignor to Westinghouse Electric & Mfg. Co. Terminal construction providing ventilating spaces about the terminals communicating with the atmosphere.

1,148,639. **Electric Range.** E. G. Van Wie, and R. W. Davenport, assignors to Detroit Stove Works, Detroit, Mich. Arrangement of independent heat units for stove top and oven.

1,148,650. **Glare-Guard for Headlights.** F. W. Beauchamp, Indianapolis, Ind. Opaque hood for securing to front of headlight.

1,148,656. **Short-Circuiting and Retrieving Apparatus for Rheostats.** L. Bradley, and H. L. Bradley, Milwaukee, Wis. Electromagnetically controlled compressible resistance.

1,148,661. **Writing Implement.** H. Dennis, assignor to S. Schmidt, Tracy, Cal. Penholder comprises battery and lamp illuminating pen.

1,148,662. **Portable Electric Lamp.** O. C. Dennis, Chicago, Ill. Comprises an electromagnet for magnetically attaching the lamp to a support. (See cut.)

1,148,665. **Telephone System.** A. H. Dyson, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. Automatic.

1,148,675. **Process of Pressing Garments.** D. C. Hale, assignor to Hale Garment Machinery Co., Cincinnati, O. Machine has electrically heated presser head.

1,148,686 and 1,148,687. **Diaphragm-Horn.**

M. R. Hutchinson, assignor to Lovell-McConnell Mfg. Co., Newark, N. J. Details of motor-vibrated diaphragms in automobile horns.

1,148,692. Tachometer. P. V. Koiff and J. E. Hollyday, assignors to Electric Tachometer Co., Philadelphia, Pa. Electric system wherein one or more of plurality of indicators may be cut out and equivalent resistance inserted to maintain calibration.

1,148,693. Priming Device. M. G. Kopf, assignor to McCormick Mfg. Co., Dayton, O. For internal combustion engines, comprises electromagnetic pump for injecting fuel in cylinder.

1,148,696. Electrode for Arc Lamps. G. M. Little, assignor to Westinghouse Electric & Mfg. Co. Contains ferruginous, titaniferous and chromiferous materials, and boracic acid.

1,148,699. Terminal Box. A. C. McWilliams, assignor to George Cutter Co., South Bend, Ind. Structure of terminal block and cover having gates in block and corresponding knock-outs in cover.

1,148,700. Process of Smelting Iron Ore. F. J. Machalske, assignor to American Ferrolectride Corporation, Plattsburg, N. Y. A basic charge of iron ore, graphite and a basic flux is subjected to an electric current to reduce the same.

1,148,709. Combined Lighting and Igniting System. A. H. Neuland, assignor to Neuland Magneto Co., San Francisco, Cal. Current from magneto is alternately diverted into ignition and lighting circuits.

1,148,719. Electric Piano. H. K. Sandell, assignor to Mills Novelty Co., Chicago, Ill. Has solenoid-operated hammers.

1,148,750. Circuit-Closer. M. A. Button, Lamar, Mo. Particular inclosed switch operated by an exterior knob on the end of switch spindle.

1,148,773. Alarm Hand-Bag. G. P. Helmers, Baltimore, Md. Comprises battery and alarm controlled by opening of hand-bag.

1,148,774. Internal-Combustion Engine. E. R. Hewitt, and A. F. Masury, assignors to International Motor Co., New York, N. Y. Mounting of magneto.

1,148,781. Telephone Set. P. L. Jensen and E. S. Pridham, assignors to Commercial Wireless & Development Co., San Francisco, Cal. Details of set having an ear piece and mouth piece rigidly connected together with auxiliary extensible ear piece and flexible tubes connecting ear pieces with stationary sound box.

1,148,787. Calling Device. J. L. McQuarrie, assignor to Western Electric Co., New York, N. Y. Structure of finger holds for manipulating call box.

1,148,788. Power-Transmission System. W. Morrison, Des Moines, Iowa. Gas engine driven through dynamo-electric clutch, controls of clutch and gas supply being co-ordinated.

1,148,792. Self-Induction Coil for Duplex or Multiplex Telephone Connections. A. H. Olsson and H. B. M. Pleijel, Stockholm, Sweden. Comprises plurality of groups of coils with means for varying magnetic leakage between coils of a group.

1,148,798. Electrolytic Refining or Extracting Process. F. R. Pyne, and H. M. Green, assignors to United States Metals Refining Co., Chrome, N. J. For use with soluble anode; electrolyte containing different constituents is allowed to stratify and different strata drawn off to the desired degrees.

1,148,800. Current-Impulse Transmitter. J. G. Roberts, assignor to Western Electric Co. Particular structure of code impulse transmitting device.

1,148,808. Electrical Steam-Generator. W. I. Thomson, assignor to Safety Car Heating & Lighting Co. Newark, N. J. Electric heater is contained in protecting tube within a water-containing tube.

1,148,827. Wireless-Telephone Transmitter. W. Burstyn, Berlin, Germany. Device for influencing rapidly alternating current by sound comprising a diaphragm condenser with gaseous dielectric upon which electrostatic forces act, these forces being varied by sound waves.

1,148,839. Flash-Light. A. J. Harnack, Pittsburgh, Pa. Contact structure for pocket light.

1,148,843. Hydro-Carbon Motor. J. H. Hunt, assignor to Packard Motor Car Co., Detroit, Mich. Direct-current ignition system including positive and negative conductors leading to transformer apparatus, and interrupter and a resistance unit in each of the positive and negative conductors.

1,148,844. Tube-Coupling for Electrical Circuits. J. H. Jackson, South Kensington, London, England. Structure for securely holding the ends of conduit tubes in alignment.

1,148,876. Overhead Conductor Point for Electric Railways. K. VonKando, assignor to Westinghouse Machine Co., East Pittsburgh, Pa. Double overhead system with trolley-operated switches for connecting normally insulated sections at junction.

1,148,884. Gearing. V. G. Apple, assignor to Apple Electric Co., Dayton, O. Particular structure of inclosed dynamo-electric machine having speed-reducing gearing interposed between the armature and shaft.

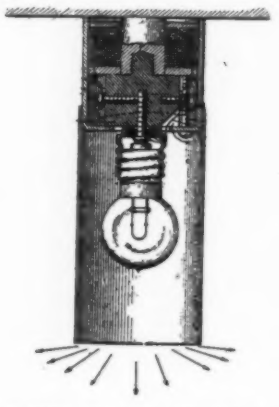
1,148,912. Substation Sender-Circuit. A. E. Lundell, assignor to Western Electric Co. For automatic telephone systems, signal circuit being controlled by switch hook and receiver being shunted during signal sending.

1,148,923. Telephone System. J. C. R. Palmer, assignor to Western Electric Co. A normally high-impedance receiving circuit and normally open transmitter circuit, the receiving circuit being in shunt of transmitter circuit when latter is closed.

1,148,931. Circuit-Closer. I. E. Rosenthal, Argenta, Ark. Heat-controlled device comprising metal box and spring contacts therein separated from box by fusible insulator.

1,148,936. Electro-Optical Cell. C. Stille, Zehlendorf-West, near Berlin, Germany. Arrangement of prisms and lenses to guide light to the front and rear sides of a light-sensitive electrode of an electrolytic cell.

1,148,941. Telephone Receiver. H. B. Wier, assignor to Western Electric Co. Particular structure for head instrument.



No. 1,148,662.—Portable Electric Lamp.

1,148,942. Headlight. R. F. Wilson, Denver, Colo. Lamp and sectional concave reflector are adjustable.

1,148,979. Means for the Collection of Fares in Public Conveyances. B. Masters, Christchurch, New Zealand. Coin-controlled, electrically operated fare indicators placed adjacent respective car seats.

1,148,986. Traffic Indicator. C. C. Prinz, Lexington, Ky. Electromagnetically operated automobile direction indicator.

1,148,990. Oil-Filtering or Purifying Device. M. C. Rogers, Weehawken, N. J. Magnetic blocks between non-magnetic blocks of greater height form separating bed over which oil flows.

1,148,997. Egg-Tester. A. L. Schooler, Cincinnati, Iowa. Arrangement of battery, light and switching means.

1,149,001. Combination Cutout for Engine Ignition Systems. J. C. Sims, Maynard, Mass. Requires certain "combination" of contact wheels and insulating disks to close circuit and has "tell-tale" to announce tampering.

1,149,003. Starting Box. M. Taigman, New York, N. Y. For ceiling suspension, and operable by depending rod or cord.

1,149,004. Lamp Shade. I. C. Terry, Buena Vista, Colo. Collapsible about lamp bulb.

1,149,017. Insulator. R. Balliet, West Hazleton, Pa. Has twisted slot for holding conductor.

1,149,018. Paper-Feed-Controlling Apparatus. T. J. Beregh, assignor to C. Francis, New York, N. Y. Motor driving support for roll of paper in printing press, has circuit controlled by sheet passing over guiding roll.

1,149,038. Electric Lamp. C. Ficq, Victoria, British Columbia, Canada. Incandescent lamp having filament arranged beneath reflecting base and inclosed by semi-circular globe.

1,149,042. Circuit-Closer for Speed-Indicators. J. Goldstein and L. Steiner, New York, N. Y. Particular structure of switch controlling indicator operated by fluid pressure according to speed.

1,149,054. Controller for Electric Generators. R. A. Hoppe, and T. E. Lee, assignors to North East Electric Co., Rochester, N. Y. Structure of two-armature, two-winding relay.

1,149,063. Terminal Connector. J. A. Jones, Indianapolis, Ind. Binding post having U-shaped recess and plug wedging wire

1,149,064. Electric-Furnace Abrasive and Method of Making the Same. H. T. Kalmus, assignor to Exolon Co., Cambridge, Mass. Manner of making a fused alumina abrasive from emery by reducing the impurities to a metallic state in arc furnace and removing the impurities.

1,149,079. Apparatus for Automatically Weighing Pulverized Material. W. Popow, St. Petersburg, Russia. Electromagnetically controlled.

1,149,096. Wire-Suspension Clamp. H. M. Somerville, Bluefield, W. Va. For supporting wire at a curve.

1,149,099. Massage Machine. L. J. Wahl, and E. W. Wahl, Sterling, Ill. Hand instrument having massage head vibrated by electromagnetic vibrator.

1,149,113. Voting Machine. W. C. Brumder, Milwaukee, Wis. Electrically operated and interlocked to prevent improper voting.

1,149,122. Apparatus for Determining Distance and Direction. P. W. Fuller, assignor to A. B. Praetsch, Boston, Mass. Range finder wherein ultra-violet rays reflected from object cause visual indication of distance and direction of object from light source.

1,149,123. Signaling Apparatus. P. W. Fuller, assignor to A. B. Praetsch. Modification of above.

1,149,140. Illuminating Means for Show-Cases. R. H. Hess, Los Angeles, Cal. Arrangement and construction of reflector and light bulb.

1,149,150. System of Control. H. A. Steen, assignor to Allis-Chalmbers Mfg. Co., Milwaukee, Wis. Automatic circuit controller comprising successively operated electromagnetic resistance switches controlled by time elements variable with current.

1,149,159. Electric Automatic Train Stop, Telephone, and Block-Signal System. W. J. Crabbe, Drum, and H. B. Rodehaver, East Auburn, Cal. Third-rail system including automatic operation of air brakes and including telephone connection between station operator and locomotive.

Patents Expired.

The following United States electrical patents expired on August 9, 1915:

608,614. Plate for Secondary Galvanic Batteries and Composition for Producing Same. C. Marscher, Berlin, Germany.

608,637. Supporting Clip for Overhead Electric Conductors. W. A. Bartley, Boston, Mass.

608,676. Circular Loom. J. Herold and C. Herold, Brum, Austria-Hungary.

608,685. Lightning Arrester. J. F. Kelly, Pittsfield, Mass.

608,711. Electric Motor. W. H. Powell, Erie, Pa.

608,714. Storage Battery. J. D. Rively, Pittsburgh, Pa.

608,721. Automatic Electric Regulator. R. Skeen, St. Louis, Mo.

608,723. Electric Arc Lamp. T. Spencer, Philadelphia, Pa.

608,768. Electrodynamic Apparatus for Operating Clipping, Brushing and Other Mechanisms. W. P. Freeman, New York, N. Y.

608,842. Electric Meter and Motor. H. P. Davis, Pittsburgh, and F. Conrad, Wilkinsburg, Pa.

608,846. Telegraph Repeater. H. P. Donnelly, Cincinnati, Ohio.

608,878. Switch for Varying Electrical Resistance. E. F. H. H. Lauckert, London, England.

608,895 and 608,896. Generator for Electrical Ignition. B. McInnerney, Omaha, Neb.

608,906. Insulation of Electric Wires. J. A. Poche. New Orleans, La.

608,911. Electric Cable. H. A. Reed, Newark, N. J.

608,928. Apparatus for Heating Air for Therapeutic or Other Purposes. W. Taylor, Edinburgh, Scotland.

608,932. Telegraphy. G. V. Trott, Chicago, Ill.

608,952. Electrical Cooking Apparatus. J. B. Cary, Baltimore, Md.